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*Descriptions of New North American Neuropterous
Insects, and Observations on some already de-
scribed.* By (the late) THOMAS SAY.

Read July 12th, 1836.

ÆSHNA, Fabr.

† Eyes in contact above.

1. *Æ. multicineta*. Reddish-brown; thorax with green lines and spots; abdomen with green bands and lateral vitta.

Inhabits Indiana.

♀ Body reddish-brown; eyes connate, dull greenish above, with a semiocellate blackish mark, and on the posterior margin pale bluish, including a black line; inferior portion tinged with gray, and with several moveable internal spots; frontal vesicle dull whitish, above reddish-brown, dull yellowish in the middle, with a quadrate blackish spot;

thorax with two anterior green lines, and on the pleura beneath each wing, also a green oblique line, between the bases of the wings are green spots; wings immaculate, tinged with ferruginous, carpal spot fuscous; accessory membrane opaque white; abdomen with a lateral, angulated and almost interrupted green vitta; segments with a double green, sutural, narrow band, and in the middle of each, another narrow band, excepting the three ultimate ones, on which are but single sutural bands; caudal foliaceous processes blackish, somewhat dilated in the middle, gradually narrowed to each extremity, and rounded at tip; feet black; thighs rufous at base.

Length $3\frac{3}{4}$ inches to tip of caudal appendices.

The abdomen tapers gradually from the base to the tip. The description is taken from a recent specimen.

[This species, which is common throughout the United States, has usually been referred to the *heros* of Fabricius.—Ed.]

2. *Æ. junius*. Green; abdomen brown, laterally bluish; wings immaculate.

L. junius, Drury, Vol. I., pl. 47, fig. 5.

♂ Body bright green; eyes brown, tinged behind and beneath with yellowish; labium yellowish; antennæ and intervening line black; frontal vesicle above with an arcuated blue line and central black dot; wings immaculate; carpal spot pale brown; posterior wings, next to the body and behind the nervures, with a small opaque white spot, terminated by a black, broad line; feet rufous; tibiæ and tarsi

black; abdomen with a dorsal and lateral interrupted raised line; brown above, with a lateral, interrupted blue vitta, originating with the second segment; first and second segments bright green; venter tinged with brown, with a blackish vitta; foliaceous appendices carinate, at the exterior tip prominently mucronate.

Length three inches.

♀ Wings with a trace of ferruginous on the anterior portion; foliaceous appendages rather smaller, lanceolate, acute.

Drury in his figure represents the abdomen as entirely green; but this is a mistake; his dried specimen had this part brown, and supposing it to have been green when living, he figured it so. Can this be *vesiculosa*, L.? It is allied to the *formosa*, Vanderlinden, which, however, appears to have a black, angulated, dorsal vitta on the abdomen, and the eyes are described to be green.

3. *Æ. constricta*. Abdomen contracted near the base, elongated, with interrupted bands; anal processes undulated and prominently mucronate.

Inhabits Indiana.

♂ Eyes in contact above; occiput black, with a yellow spot between the eyes; front greenish-yellow; between and behind the antennæ, with the exception of a yellow transverse spot, black, connected anteriorly with a transverse black line; stethidium brownish, varied with greenish vittæ before, and oblique ones on the pleura, and spots on base of the wings; wings hyaline, a little lactaceous; stigma moderate, black; anal membrane

black, white at base; abdomen elongated, fuscous, with somewhat glaucous interrupted bands and spots; two basal segments thick, the second with a narrow interrupted band; third remarkably contracted in the middle, with two small transverse spots, and on the posterior margin an interrupted band; remaining segments having the same markings as the third, together with a large double lateral longitudinal spot, excepting the ultimate and the caudal segments, which have only the posterior interrupted band; caudal segment two-thirds the length of the preceding one; anal processes as long as the two preceding segments, undulated, foliaceous, with a longitudinal line in the middle, dilated on the inner edge beyond the middle, near the inner tip, hairy, and with a tooth, and rounded prominence; at tip rounded, with a prominent cylindric spine; inferior process half the length of the superior ones; feet piceous, or blackish; anterior thighs with a glaucous line behind.

Length less than three inches.

The third abdominal segment is remarkably contracted. The posterior interrupted bands might be called rounded or quadrate spots, and are largest and more glaucous on the posterior segments. It resembles *Libellula tenebrosa*.?

4. *Æ. clepsydra*. Abdomen contracted near the base, with interrupted bands; anal processes foliaceous.

Inhabits Massachusetts.

This is so much like *constricta*, S., that it may possibly prove to be a variety. Nevertheless, the anal

appendices are very different. These are foliaceous, oblong-oval, gradually narrowed at base, with a small angle at tip; upper side with a carinated line; caudal segment of the abdomen with an elevated compressed tooth near its base above.

Length less than three inches.

The only individual I have seen was sent me by Dr. Harris.

5. *Æ. vinosa*. Abdomen contracted near the base; wings very slightly tinged with ferruginous; stigma yellowish; pleura with two bright yellow orbicular spots.

Inhabits Massachusetts. Harris.

Length over two inches and a half.

Resembles *clepsydra*, S., very closely, but it may be distinguished by the color of the wings and stigma, the bright orbicular spots of the pleura, the yellow antennæ, and the absence of black markings on the summit of the frontal vesicle. The anal processes resemble those of *clepsydra*, and the neck of the wings is fuscous, as in *janata*, S.

6. *Æ. janata*. Wings immaculate; abdomen contracted near the base, banded; anal processes at tip unarmed, pediform.

Inhabits Massachusetts.

♂ Eyes in contact above; occiput dusky; posterior canthus of the eyes dull yellowish; space between the eyes transversely triangular, depressed, dusky, excepting the posterior edge, which is yellowish, and is a raised line; antennæ and vertex black, excepting a transverse, obscure, arcuated line; front

yellow; summit with a black line and anterior margin; thorax brown, two dull glaucous vittæ before; pleura, two oblique yellow vittæ, margined with black; wings hyaline, immaculate; basal neck fuscous; anal membrane white; stigma dull yellowish; abdomen dusky; third segment deeply contracted; segments with a yellowish band at base, interrupted one at tip and spot in the middle; caudal segment but little shorter than the preceding one, and carinate at base, beneath with the lateral tubercles of the second segment compressed and denticulated; caudal processes a little undulated, being slightly dilated beneath near the base, and more obviously so towards the tip, so as to be pediform; tip unarmed; inferior process hardly half as long as the superior ones; feet yellowish, blackish beneath.

Length over two inches.

Sent to me by Dr. Harris. I have not seen the female.

It resembles *constricta*, S., but is smaller, the caudal segment is subequal to the preceding segment, and the superior caudal processes are suddenly enlarged near the tip, and are unarmed.

7. *Æ. furcillata*. Inferior anal process widely forked at tip.

Inhabits Massachusetts.

♂ Body brownish; pleura with three oblique, yellow lines; between the wings varied with whitish; wings immaculate, anal membrane white; stigma fuscous; abdomen, third segment very much contracted; segments with a double spot at tip, a

smaller double one in the middle, and a triangular spot at base; anal processes narrow, foliaceous, on their basal half subcylindrical, with two small distant teeth on the inner inferior side; beyond the middle rectilinear, flattened, sides parallel, rounded at tip; inferior process about half as long as the superior pair, wide, widely emarginate down to its middle.

Length over two inches.

This may readily be distinguished by the widely forked form of the inferior caudal process. I have seen but the individual sent me for examination by Dr. Harris.

8. *Æ. obliqua*. Thorax brown, with two oblique yellow vittæ before; front yellow, with a black band.

Inhabits Indiana.

Eyes angularly contiguous above; front greenish yellow, with a black band; antennæ black; space between the antennæ and region of the stemmata, black; occiput dull yellowish; occipital interval tuberculiform, greenish-yellow; posterior upper canthus of the eyes black, passing in a hairy ridge to the top of the occipital tubercle; stethidium fuscous; two yellow oblique vittæ before; middle between the wings with a yellowish spot; pleura with two distant, parallel, oblique, yellow vittæ, margined with black; wings hyaline, immaculate; stigma black; anal membrane white; abdomen blackish, a dorsal series of yellowish spear-shaped marks, those of the two posterior segments dilated, the last one quadrate; anal appendices not longer than the

anal segment, mucronate; inferior process as broad at its tip as the tip of the abdomen, and widely more or less emarginated; beneath, first and second abdominal segments pale, the lateral tubercle rounded, unarmed; feet black.

Length about two and a half inches.

Var. A. Dorsal series of the abdomen none; a lateral series of dull yellowish, oblong, subtriangular spots.

The variety was sent to me by Dr. Harris. I have not seen the female.

† † Eyes distant above.

9 *Æ. fraterna*. Wings immaculate; thorax yellowish, with brown lines; abdomen brown, with a yellow vitta; dilated at tip.

Inhabits U. S.

Length less than two inches.

♂ Head greenish-yellow; eyes distant above; labrum with an indented point in the middle; between the eyes a black band, including the stemmata and antennæ; thorax greenish-yellow, with three double fuscous vittæ; between the wings a greenish-yellow vitta; wings immaculate; costal nervure greenish; carpus fuscous small, the transverse line of its base passing obliquely across the second series of cellules; accessory membrane very small; abdomen dark fuscous, cylindrical, thicker at base, and much dilated at tip; a dorsal yellowish line, interrupted by the incisures, wider on the basal segment, and exhibiting a spot only on two of the dilated segments; anal appendices four, short, subulate; sides of the abdomen with a dilated

yellowish vitta on the basal segment, on which is also a lateral tubercle; remaining segments with a spot on the base of each, those on the dilated segments are much larger, that on the terminal segment occupying all the side, yellow and conspicuous; pleura green-yellow, with two oblique, fuscous lines; feet fuscous; tibia with a dull green line; the dilated tip of the abdomen is very concave beneath.

♀ Tubercles of the basal segment of the abdomen obsolete; abdomen at tip somewhat less dilated; anal appendices two.

Length two inches.

Common in June, on the banks of the Wabash.

It resembles *forcipata*, Fabr., closely, but the feet of that species are yellowish above; the dorsal line of the abdomen is capitate on each segment, and on the basal segment trilobate.

It belongs to the genus *Gomphus*, Leach.

10. *Æ. stigmata*. ♀ Body yellow; stemmata rather large; thorax with a double brown arcuated vitta before, each side of which is an abbreviated, oblique, brown line, and another brown line on the suture of the pleura; wings with a very slight tinge of yellowish, at their origin ferruginous; costal edge whitish, with two series of minute black points; stigma rather large, blackish; tergum, each segment, excepting the basal and ultimate ones, with a longitudinal spot each side, contracted in the middle and not reaching the base; terminal processes conic, acute, not at all compressed; thighs with a brown line above towards the tip; tibia and

tarsi black-piceous; the former yellowish on the inner side; abdomen not remarkably clavated.

Length two inches.

This species resembles the *fraterna*, but it is much more yellowish, the stigma of the wings is about double the size, the markings differ. It also resembles *unguiculata*, Vanderlinden, but the stigma is much larger.

LIBELLULA.

1. *L. hymenæa*. Wings hyaline; posterior wings with the anal margin brown, with white nervures; anal membrane white, opaque.

Inhabits Indiana.

♀ Vesicular front fulvous; stethidium dull yellowish-green; wings hyaline; stigmata small; posterior pair wider at base, the anal margin brown, particularly towards the anal angle, which, however, this color does not reach, neither does it attain to the origin of the wing, the nervures of this brown margin are yellowish-white; anal membrane opaque, pure white; scutel tricarinate; abdomen with a carinate line above, and on each side; second, third, fourth, and fifth segments with two transverse, elevated lines towards their middles; anal processes cylindrical, mucronate; feet blackish; anterior pairs of thighs greenish-white externally; anterior pairs of tibiæ with a whitish line.

Length nearly two inches.

Readily distinguishable by the whitish nervures in the brown anal margin of the posterior wings, and the snow-white anal membrane. It seems to be allied to *L. carolina*.

2. *L. carolina*, Linn. Basal fifth of the posterior wings fuscous.

Length two inches.

Drury's Ins., Vol. I., pl. 48, fig. 1. Ency. Meth., p. 565.

3. *L. transversa*. Thorax with a white band before the wings, and another between the wings.

Inhabits Massachusetts.

♂ Body brownish; eyes contiguous above in a small part of their curvature; thorax with a yellowish-white band at the anterior base of the anterior wings, and a white band between the two pairs of wings, descending obliquely on the pleura, where it is yellow; wings hyaline; basal costal cellula brown; stigma slender, yellowish, not very obvious; anal membrane white; abdomen slender, wider near the tip; segments paler on the basal half; lateral carina none; anal processes lanceolate, slightly arcuated, exterior edge towards the tip minutely denticulate; inferior process nearly as long as the superior ones; tarsi blackish.

Length two inches.

Dr. Harris sent me a male specimen, I have not seen the female.

4. *L. tenebrosa*. Wings immaculate; body greenish-black, with yellow lateral marks on the trunk.

Inhabits Indiana.

♂ Eyes bright emerald green, in contact above; front brownish towards the mouth, near the antennæ bright green, above the antennæ brownish; mouth beneath yellowish; vertex brownish; thorax dark

greenish, tinged towards the head and on the sides with vinaceous; an oblique yellowish line under each wing, and a yellowish spot each side behind; wings hyaline; stigma blackish; anal margin with a thick fuliginous nervure, tinged on its side with ferruginous; anal membrane blackish, whitish at base; abdomen greenish-black, immaculate, very slender behind the base, thickest at base, and fusi-form beyond the middle; anal appendices arcuated, superior pair with a tooth on the superior middle, at tip abruptly incurved and truncate; feet immaculate.

Length over two inches.

5. *L. lydia*. Wings with a broad, brown band; and at base an abbreviated line.

L. lydia. Drury's Ins., Vol. I., pl. 47, fig. 4, Oliv. and Ency. Meth., p. 570.

This species agrees with the short description in Turton's Linn., of the *trimaculata*, Degeer, and I should certainly consider it the same species, if Olivier had not decided the *trimaculata* to be the same as the *bifasciata*, L.

6. *L. bifasciata*, Fabr. Wings with brown semi-facia, tip and basal line.

L. pulchella, Drury, Vol. I., pl. 48, fig. 5.

L. bifasciata, ♀ Fabr. Oliv. Enc. Meth., p. 561.

L. versicolor, Fabr. ♂

L. trimaculata, Deg. Ins., Vol. III., pl. 26, fig. 2.

♀ Destitute of the white wing-spots; abdomen brownish-livid, with a lateral vitta, which is gray, and becomes gradually yellow to the tip; beneath

with a yellow lateral vitta, being a continuation of the posterior line of the pleura, and becoming obsolete behind.

It is on the authority of Olivier, that I quote Degeer's *trimaculata* for this species, as I do not possess the work of the latter author.

7. *L. ternaria*. Wings with a fuscous line or spot at base; a spot or band in the middle and another near the tip.

Inhabits Massachusetts.

♂ Head, a black line between the antennæ; eyes above in contact by a curved line; posterior lateral canthus of the eyes with two yellow spots; pleura with two oblique lines; wings with a pale ferruginous vitta, extending from the base along the anterior submargin to the middle, thence along the margin to the tip, interrupted by the stigma, which is black; on the middle of the costal margin a fuscous spot, and from the stigma a fuscous band, which does not reach the tip; at base of the posterior wings, behind the vitta, is a rather large and conspicuous, irregular, fuscous spot, reticulated with whitish nervures; anal membrane white; marginal cellules ten or eleven between the middle and stigma; abdomen greenish-yellow at base, and black at tip, with a yellow lateral vitta; anal processes fusiform, black, subacute; inferior process hardly one-third as long as the others.

♀ The spot of the middle of the wing is extended into a semifacia, and the subterminal band is more distinct; at the base of the posterior wings is a black, securiform line, one-fourth the length of the

wing, behind which is a large, pale, ferruginous spot, reticulated with whitish nervures

Length one inch and seven-tenths.

At first sight resembles *L. bifasciata*, Fabr., but is quite different; the ultimate wing band is not terminal, the anal processes also are dissimilar.

I have not seen any other specimens than the sexes sent me by Dr. Harris for examination.

In some of its characters it resembles the *L. quadrimaculata*, Linn., of Europe, but that has not the terminal wing bands.

8. *L. leda*. Wings at tip, point on the costal margin, and line at base, brown.

Inhabits U. S.

L. lydia, Drury's Ins., Vol. II., pl. 47, fig. 1, and Oliv. Ency. Meth., p. 570, No. 8.

Thorax brown, with a pale vitta; pleura greenish; wings with a blackish point in the middle of the costal margin, and oblong blackish carpus; terminal half of the anterior margins and tip fuscous; a slender black line, at base, equal in length to the breadth of the body; abdomen with a broad, yellowish-rufous lateral vitta; anal segment remarkably short; on each posterior orbit of the eyes are two yellow spots.

Length about two inches.

Var. A. Fuscous tint on the anterior margin of the wings obsolete, being only a very slight tinge of ferruginous.

Drury's figure represents this species very well, but the fuscous tips of the wings are generally broader, though sometimes altogether wanting.

Olivier has two different species of the name of *lydia*, both of which he quotes from Drury. We have therefore changed the name of the present species.

9. *L. quadrupla*. Thorax with a whitish vitta; abdomen with a lateral, yellowish one; wings with a bicolored stigma, and basal blackish line.

Inhabits Massachusetts.

This insect very closely resembles *L. leda*, S. It differs, however, in being smaller, and in having the stigma larger, white, with a black tip. The male is destitute of the black wing tips, and like the female, has the exterior half of the costal margin tinged slightly with ferruginous. The anal processes are short, subcylindric, a little smaller at base, and beneath, towards the tip, minutely denticulated; at tip a small point.

The sexes were sent me by Dr. Harris.

Length from one inch and three-fifths to one inch and seven-tenths.

10. *L. basalis*. Wings fuscous on the basal half.

Inhabits U. S.

♂ Body brownish-black; head immaculate, dark bluish; wings dark fuliginous opaque, on the basal half, beyond which is a broad, milk-white, almost opaque, band; stigma blackish; abdomen somewhat depressed, of equal diameter nearly to the tip, dusky, with a lateral dull yellowish vitta; beneath black-brown.

Length nearly two inches.

[In a note attached to this description by Mr. Say,

is a reference to *L. marginata*, Degeer. Wings fuscous from the base nearly to the middle.

L. dimidiata, Fabr. V. Enc. Meth. refers to Seba, which is quite different. Said to be from Surinam, and is much smaller, to which species the above described insect seems to bear some resemblance in the arrangement of its colors.—ED.]

11. *L. eponina*. Upper wings bifasciate, and with a spot near the base; lower wings with a band and interrupted one, and subbasal line and spot.

Inhabits Pennsylvania and Indiana.

L. eponina, Drury, Vol. II., pl. 47, fig. 2. Oliv. Enc. Meth., p. 572, No. 19.

Wings pale ferruginous; upper pair with a subbasal spot, band in the middle, and another band before the stigma, fuscous; inferior wings with a corresponding band towards the tip, interrupted band in the middle, undulated, longitudinal line at the base, and spot near the anal angle, fuscous; anal membrane white; stigma yellowish.

Length nearly one inch and a half.

A beautiful and strongly marked species.

12. *L. acuta*. Wings immaculate; body greenish-yellow; abdomen with the edges blackish.

Inhabits Mexico.

♀ Body greenish-yellow; eyes approaching above, but hardly touching, the nearest parts not rounded, almost acute; orbits before and above with a black edge; stethidium immaculate; abdomen pale yellowish-brown, yellowish green at base; the acute longitudinal edges, above and each side, black; the

transverse edges and a subbasal transverse line on each segment fuscous; venter also with a black line; feet black; thighs yellowish, with the spines black, and on the anterior pairs a line beneath.

Length one inch and three-fifths.

The quadrilineate abdomen, with the subacute proximate portion of the eyes distinguish this species; the abdominal lines are not dilated, but limited to the edge of the carinæ. The frontal vesicle is greenish-yellow, with a dark transverse line at the antennæ.

13. *L. berenice*. Frontal vesicle blue above; wings ferruginous at base.

Inhabits U. S.

L. berenice. Drury's Ins., Vol. I., pl. 48, fig. 3.

Front whitish, steel-blue above; eyes obtuse above and connate; trunk brownish, with two greenish-yellow vittæ before, and with three oblique broad and obvious yellow lines each side under the wings; between the wings varied with blackish; wings immaculate, or with a tinge of ferruginous at their origin, particularly of the posterior pair, and on the middle; anal membrane blackish; stigma rather large and blackish; feet black; coxæ and trochanters yellow; inferior side of the anterior thighs yellow; abdomen with a dorsal black vitta, including the carina, and a lateral black vitta above the lateral carina; lateral carina black; these vittæ are more and more widely confluent at the sutures, towards the tip of the abdomen, which is entirely black.

Length from one inch and a half to one inch and three quarters.

It may be distinguished by the blue top of the frontal vesicle, and the ferruginous mark at base of the wings. The ferruginous cloud on the middle of the wings is often altogether wanting. It also varies in having no abdominal vittæ, excepting a vestige at base. The blue color sometimes extends down the front. The abdomen is also sometimes blue, and the thorax sometimes black. Drury describes the abdomen of the female as yellow, with black annulations, and that of the male blue.

The inferior anal process is at least two-thirds the length of the superior ones, which are arcuated, with a tooth beneath near the tip, and at tip acute.

A specimen from Dr. Harris.

14. *L. rubicundula*. Abdomen sanguineous, with a lateral black vitta; wings pale ferruginous at base; anal appendices in the male with a tooth on the inferior middle.

Inhabits Indiana and Massachusetts.

Male. Eyes brown, in contact above; front greenish-white; mouth pale yellowish; thorax obscure brown, immaculate; between the wings a little tinged with dull sanguineous; wings with a very small ferruginous spot at base, not over one-tenth of an inch in length, more evident on the inferior wings; stigma brown; about nine marginal cellules between the stigma and middle of the wings; tergum bright sanguineous, above carinate, immaculate, on each side a black line, which dilates

towards the tip of each segment; anal appendices deflected, longer than the inferior conic one, mucronate, and with a strong tooth on the inferior middle; feet blackish, venter pale.

Length one inch and a half.

Variety. The ferruginous tinge of the base of the wings, extending to the middle; that of the superior pair chiefly on the anterior half of the wing; that of the inferior pair more obvious, much broader, extending nearly to the thinner margin.

Length one inch and two-fifths.

I have found many individuals of this species.

V. L. *ferruginea*. Enc. Meth., 565.

15. L. *semicincta*. Wings tinted on the basal half with pale ferruginous; anal processes with an angle beneath near the tip.

Inhabits Indiana and Massachusetts.

♂ Antennæ black, with a blackish line between them; thorax brownish; pleura yellowish; wings hyaline; stigma rather small, its marginal nervures thick and black; basal half more or less tinted with pale ferruginous, particularly on the inferior wings; about seven marginal cellules between the middle and the stigma; anal membrane white; abdomen with a dorsal and lateral edge; paler at base, and with a lateral black line; anal processes deflected, rectilinear, cylindrical, with three or four minute denticulations beneath, an angle beneath near the tip, and the tip acute; inferior process extending nearly to the tip of the superior pair.

Length about one inch.

Very much like a small specimen of *rubicundula*, S., but differs in several characters, particularly in the anal processes, and in the number of marginal cellules.

16. *L. simplicicollis*. Wings immaculate; stethidium yellowish; abdomen pale brown, a little varied with black.

Inhabits Indiana and Massachusetts.

♀ Frontal vesicle pale greenish-yellow; a black band across at the antennæ; occiput and posterior orbits black, with yellow spots; eyes acute above, almost meeting; stethidium green-yellow, alternating with black at the superior base of the wings; wings immaculate; stigma fuscous; anal membrane narrow, black; feet black; thighs on their posterior side brownish; abdomen brownish, with slender incisural black lines and black edges to the carinæ; a black spot on each, excepting the three basal ones; beneath black; anal appendices very short, green, mucronate.

Length one inch and a half.

Of the male I have but one specimen, which is of a greenish-yellow color, with the sutures and abdominal spots contrasting strikingly with it.

Dr. Harris sent me a specimen for examination.

17. *L. obsoleta*. Wings with a submarginal series of six or eight brown spots.

Inhabits Indiana and Massachusetts.

Body dusky; wings hyaline; anterior marginal and submarginal longitudinal nervures dull yellowish; anterior wings with a submarginal series of

small brownish spots from the base to the middle, the latter spot largest, transverse, and reaching the anterior edge; posterior wings with six corresponding submarginal spots; a fuscous spot at the anal base of each wing; anal membrane black, with its basal half white; stigma dull yellowish; abdomen with the incisures black, a dorsal and lateral carinated line; feet with black spines.

Length about one inch and three-fifths.

The pleura and base of the abdomen are somewhat marked with brighter yellow. The brown spots of the anal base and the submarginal spots of the wings, are sometimes obsolete, or altogether wanting anal appendices ♂ arcuated, unarmed; inferior process a little curved upward, over three-fourths the length of the superior pair.

A female specimen sent me for examination by Dr. Harris has the spots of the anal base of the wings more obvious.

18. *L. exusta*. Wings with a fuscous spot at base; anal processes subequal.

Inhabits Massachusetts.

♂ Body yellowish-brown, covered with a cinereous pubescence; a black line between the antennæ; eyes in contact by a small portion of their superior curvature; thorax above pale brownish with a yellowish-green vitta from the anterior wings forward; wings hyaline, very slightly tinted with yellowish; costal cellules, between the middle of the wing and the stigma, about twelve or thirteen; stigma yellowish; a fuscous longitudinal spot on the middle

of the base of the superior wings as long as the width of the thorax; a larger, triangular, fuscous spot at the base of the inferior wings, a little longer than that of the upper wing; anal membrane white; abdomen with a dorsal and lateral edge; anal processes somewhat linear, a little arcuated, not narrowed at base, minutely denticulated towards the tip, which is acute; inferior process nearly as long as the others.

Length one inch and two-fifths.

I have not seen the female. From Dr. Harris.

19. *L. cynosura*. Posterior wings with a small fuscous spot at base; anal processes excurved.

Inhabits Massachusetts.

♂ Body brownish; head with a black line between the antennæ; tubercle above the antennæ large; eyes in contact above by a curved line; pleura pale greenish, a yellowish band beneath the anterior wings; wings hyaline; anteriors immaculate; about six costal cellules between the middle and the stigma, which is dull yellowish; posterior pair with the basal, costal, and subcostal cellules fuscous, and an irregular fuscous spot between them and the anal angle; anal membrane white; abdomen with a dorsal and lateral edge; on each side, near the base, a yellow spot, beyond which is a honey-yellow vitta; anal processes longer than the caudal and ultimate segment of the abdomen together, a little dilated and curved outwards towards the tip, which is rounded, abruptly narrowed beneath towards the base; inferior process two-thirds the length of the superior ones.

Length one inch and a half.

Resembles *exusta*, but differs in the number of costal cellules and in the form and length of the anal processes.

It was sent to me by Dr. Harris.

20. *L. tenera*. Wings with an abbreviated band and subbasal spot.

Inhabits Indiana, Pennsylvania, and Massachusetts.

♀ Body fuscous; frontal vesicle yellowish, brownish above; eyes contiguous above; thorax with two broad glaucous vittæ before; pleura with two oblique, glaucous wide lines; wings hyaline, a fuscous, undulated band on the middle, not reaching the thinner margin; a fuscous spot midway between the band and base, somewhat larger on the posterior wings; costal margin slightly tinted with ferruginous; stigma brown; anal membrane small, white; abdomen rather wide, second and third segments with a transverse, elevated line on their middle; feet yellowish.

Length nine-tenths of an inch.

It has some resemblance to *L. varia*, Linn., but is a very different species. It is not uncommon, but is more limited than some other species to the immediate vicinity of ponds and sluggish waters.

21. *L. tenuicincta*. Small; wings ferruginous.

Inhabits U. S.

Body fuscous, small; eyes meeting above; front yellow; above fuscous; thorax immaculate, somewhat hairy; pleura with about two yellow spots;

wings entirely ferruginous; stigma darker, reddish; anal membrane small, blackish; feet dull yellowish; tergum with a very slender, bright yellow, transverse line at each incisure; anal appendices arcuated mucronate; inferior process nearly as long.

Length over four-fifths of an inch.

This small species is common in many parts of the Union, flying rather slowly over the surface of ponds, and, like other species, settling upon sticks and other objects that project above the surface.

V. *L. obscura*. Enc. Meth., 562.

Is it the male of *tenera*?

The following note, taken at the island of Sanipuxten, on the eastern shore of Maryland, I find amongst my papers.

L. imbuta. ♂ Abdomen red; segments black at tips; thorax green; frontal vesicle bluish; eyes darker.

♀ Abdomen greenish; segments black at tips.

I have not observed this species in Indiana.

CALEPTERYX, *Leach*.

1. *C. materna*. Wings steel-blue, with a tinge of brown; a white, opaque, costal spot near the tip.

Libellula virgo, γ. Drury's Ins., Vol. I., pl. 48, fig. 2.

2. *C. opaca*. Bluish green, wings darker, immaculate.

Inhabits Massachusetts.

♂ Body bluish-green, or blue, varied with green;

beneath blackish; antenna, second and third joints equally long; wings subopaque, blackish-blue, with a tinge of brown, destitute of any costal spot; abdomen blue, segments at their tips greenish; feet black.

Length about one inch and seven-tenths.

Var.? Wings nearly hyaline, only tinged with the color.

For this species I am indebted to Dr. Harris.

3. *C. æquabilis*. Blue and green; wings hyaline, a large blackish spot at tip.

Inhabits Massachusetts.

♂ Head and thorax green, tinged with blue; labrum blackish violaceous; antennæ, second joint rather longer than the third; wings hyaline, without any costal spot, a large fuliginous blackish spot at tip, occupying the fourth of the length on the anterior pair, and the third of the posterior pair; abdomen blue; beneath blackish, towards the tip greenish; anal processes curved inwards, and towards the tip a little downwards, of equal diameter, excepting that on the inner side they are a little dilated beyond the middle, upper side a little spinous; at tip obtuse; inferior processes two, rectilinear, cylindrical, a little shorter than the superior pair, dilated on their inner base; pectus and feet black.

Length less than two inches.

A female specimen, also sent me by Dr. Harris, may, perhaps, be of the same species, inasmuch as the wing-spots correspond, except in being paler; but the wings have an opaque white spot near the costal tip.

LESTES, *Leach*.

1. *L. rectangularis*. Wings divaricated; forceps acutely bidentate beneath.

Inhabits Indiana and Massachusetts.

♂ Body dull greenish, more or less tinged with cupreous; head above black, with a very slight coppery tinge; each side of the mouth yellow; labrum bluish yellow; mandibles piceous at tip; eyes (when recent) ultramarine; thorax with the dorsal suture and lateral vitta, varying from pale yellowish to verditer green; wings hyaline, cellules chiefly pentagonal; stigma blackish, its length nearly three times greater than its breadth; abdomen nearly as long again as the wings; tergum with the basal segments a little paler, darker at their tips, and with a hardly obvious whitish, interrupted band at their bases; ultimate segments much darker; anal segment with a longitudinal carina beyond the middle; forceps shorter than the two ultimate segments taken together, with two oblique, very acute teeth beneath; beyond the middle curved downward and inward, so as to become nearly perpendicular to the basal half; inferior processes almost reaching the incurved tip of the forceps; beneath pale, whitish, more or less tinged with yellowish-green.

Length over two inches.

♀ Abdomen much shorter than in the male; tergum with a more obvious cupreous color; feet (as in the male) pale yellowish, with two black lines on the thighs and one on the tibiæ.

Length one inch and seven-tenths.

This species made its appearance here about the middle of August. It may at once be distinguished, when at rest, from the *apicalis*, by its divaricating wings. It resembles a South American species, which, not finding described, I have called *undulata*,* but the abdomen of that insect is much shorter.

2. *L. basalis*. Wings sanguineous at base.

Inhabits Missouri, Indiana, and Massachusetts.

♂ Head cupreous; thorax cupreous, with black sutures; pleura with yellowish, oblique lines; wings with quadrangular cellules and an oblong dusky carpus; basal fourth, bright sanguineous; pectus yellowish; feet black; tibiæ exteriorly dull yellow; abdomen steel-blue, with slender white incisures; beneath yellowish, with a black middle line; forceps arcuated, spinous above, with a large double tooth beneath; tip obtuse.

Length one inch and three-fourths.

♀ Body green; head with a yellow, abbreviated line on the anterior orbits, yellow nasal margin and labrum; thorax with a lateral yellow vitta; wings tinted with yellowish-brown towards the base; car-

* *L. undulata*. Wings divaricated; forceps undulated at tip.

Inhabits South America.

♂ Body pale; head with a broad green band between the eyes; thorax with a double green vitta; wings hyaline; cellules chiefly pentagonal; stigma light brown; abdomen not one-third longer than the wings, coppery green above, whitish at tip; forceps as long as the two preceding segments taken together, undulated at tip; on the basal half not dilated, and having beneath two remote teeth, of which the basal one is very obtuse, in the form of a lobe.

Length one inch and three-fifths.

pus white; abdomen with a slender, longitudinal line, and slender basal annulation on each segment; beneath whitish, with a black line; feet black; thighs yellowish beneath; tibiæ yellowish above.

Length over one inch and three-fourths.

Of this fine species, Mr. Nuttall presented me two individuals which he obtained from Missouri. The bright sanguineous color of the wings in one sex terminates abruptly, and in the other the very pale yellowish-brown color of the same part gradually disappears towards the middle.

In the *A. caia*, Drury of South America, (*A. Brightwelli*, Kirby?) the inferior pair of wings have a reddish spot at tip.

It is very abundant in some situations in Indiana, and is easily taken.

3. *L. eurinus*. Wings immaculate; forceps curved inward, bidentate.

Inhabits Massachusetts.

♂ Body blue, somewhat varied with greenish and violaceous; pectus beneath yellowish; antennæ, second joint shorter than the third; labrum and each side of the mouth yellowish; thorax with a yellow vitta, behind bifid and divaricated; between the wings yellowish; pleura chiefly yellow; wings with a slight tinge of greenish-yellow; stigma blackish; abdomen blue, segments greenish at tip; beneath, a black vitta, and segments blackish behind; forceps curved inward, bidentate beneath; inferior processes conic, less than half as long as the forceps; feet black; thighs whitish beneath; tibiæ with a white line on the exterior side.

Length one inch and nine-tenths.

The body is much shorter, and the wings larger than the *rectangularis*, S., which it resembles; the inferior anal processes also are shorter, and the superior pair not decurved so much. From Dr. Harris.

AGRION.

1. *A. verticalis*. Head green, blackish above; occiput with a bluish spot on each side.

Inhabits Indiana.

♂ Body above dark bluish, somewhat glaucous, with an obsolete brassy reflection; head light green; above and behind black, with an obsolete brassy reflection; frontal projection black above, sometimes connected by this color with the color of the vertex; eyes bright yellow-green, fuscous on the superior surface; occiput with a dilated pearlaceous blue or glaucous spot each side; hairs numerous and rather long; thorax with numerous, rather long hairs; a brassy vitta and lateral black lines; wings hyaline; cellules chiefly quadrangular; stigma short, rhomboidal, brownish; tergum slightly pruinose, tips of the segments a little darker, and extreme base of the segments with an obsolete yellowish band; terminal segments a little darker and slightly iridescent; venter pale green or gray, with a black line; pectus and pleura greenish; feet greenish; thighs black above; tibiæ with a black line on the exterior side.

Length one inch.

♀ Body of a darker color than that of the female; the eyes are black above; the occipital spots are

small and orbicular; the tergum is brassy-green, with a very narrow, white, interrupted band at base of each segment; two ultimate segments bright pearly blue; anal segment on the superior tip with an emarginate, slight elevation.

Length one inch.

This species is not abundant. I obtained several specimens in August.

2. *A. hastata*. Stigma almost detached from the margin, sanguineous.

Inhabits Indiana.

♂ Head greenish; above dark metallic-greenish; eyes green, above blackish; frontal projection blackish above; occiput with an orbicular glaucous dot each side; mouth yellowish; thorax brassy-greenish, sometimes tinged with blue; a slender pale line each side of the back; wings with chiefly rhomboidal cellules; stigma of the superiors obovate acute, connected with the edge of the wing only by a short petiole, sanguineous; stigma of the inferior wings rhomboidal, blackish; abdomen bright yellow; tergum with green hastate spots and lines; two or three ultimate segments immaculate; anal segment with an elevated, prominent spine-like process, bifid at tip; two very small, incurved, lateral hooks; venter with a slender, blackish line; pleura, pectus and feet pale green; thighs with a black line towards their tips, obsolete on the posterior pair.

Length over nine-tenths of an inch.

The edge of the superior wing, opposite to the stigma is a little convex and white.

♀ Head yellowish; above dark metallic-greenish; eyes above light brown, and beneath this color is an obsolete parallel line; occiput with the spots, connected by a paler line; thorax on each side with an obscure tinge of fulvous; stigma of the superior wings not separate from the edge, rhomboidal, yellowish-white; tergum green, tinged with dull fulvous each side before the middle; tail with two small angulated processes beneath, which do not extend beyond the extremity of the abdomen.

Var. a. Occiput fulvous; the fulvous color of the sides of the thorax and of the abdomen is more vivid and on the latter prevailing so that the green of the tergum is obsolete before the middle.

It is common in August, in meadows.

3. *A. antennata*. A glaucous occipital band; two basal joints of the antennæ subequal.

Inhabits Indiana.

♂ Body obscure bluish-green, somewhat metallic; head green before; mouth yellow; vertex and occiput black, the latter with a glaucous band, clavate each side; eyes dark greenish, above blackish; antennæ with the two basal joints much thicker than the others, equal in length, the first cylindric, the second attenuated at base; thorax with a glaucous vitta each side of the back; wings hyaline; cellules chiefly quadrangular; stigma rhomboidal, not longer than broad; tergum with a glaucous band at base of each segment; the green color at tip extends upon the sides; venter glaucous, with a black line; pleura glaucous; pectus paler; feet whitish, with a

broad black line on the thighs, and another on the tibiæ, excepting the posterior ones.

Length one inch and two-fifths.

This species is smaller than *apicalis*, and larger than either *verticalis* or *hastata*, Nob., and is distinguished from them by the elongation of the basal cylindric joint of the antennæ, being equal in length to the second joint.

4. *A. apicalis*. Two or three ultimate abdominal segments pearlaceous blue above.

Inhabits U. S.

Head pale brown; a black band on the vertex between the eyes, and sometimes two black circles; thorax pale brown, or bluish pearly, with black sutures; wings hyaline, with chiefly quadrangular cellules; carpus short, rhomboidal, brown, or dull whitish; nervures black; abdomen black-green; segments excepting the terminal three, with a dull whitish, basal annulus, from which proceeds a slender line, and on the side, a broader one of the same color, neither of which reach the tip of the segment; three ultimate segments dull yellowish; or cerulean pearlaceous above and on each side; pleura and pectus pale yellowish; feet pale yellow; thighs lineated with brown; tarsi with black incisures and extremity.

Length one inch and a half.

A very common species, remarkable, when recent, by the color of the tip of the abdomen and of the thorax, which arrests the attention when the insect is on the wing.

But it varies much in color. The vittæ of the abdomen are more or less dilated, sometimes hardly visible; the head and thorax are, in some individuals pearlaceous-blue, and the ultimate abdominal segment varies from dull yellowish, with blackish lines, to a bright pearl-blue, sometimes dull-yellowish with a pearlaceous-blue lateral spot on each.

It is very common.

The female has two small angulated processes beneath the tail, which do not extend beyond the tip of the abdomen, the nails at their extremities are curved downwards; the hooks at the tip of the abdomen of the male are not obvious.

The description is from recent specimens. The fine blue color disappears in the cabinet specimen.

BÆTIS, Leach.

1. *B. interpunctata*. Whitish; head greenish; segments of the tergum black on the posterior edges.

Inhabits Indiana.

Body yellowish-white, tinged with green; head rather prominent, yellow-green; vertex with a lateral black point; eyes with a longitudinal black line; stemmata distant, each with a black orbit; anterior one less than half the size of the others; seta of the antennæ black; front with a black angular line under the antennæ; neck distinct, separating the head from the trunk, with a black line each side; thorax somewhat brownish; wings on the anterior margin greenish, with black cross nervures, and a distinct, black, abbreviated, longitudinal

line on the middle, between the third and fourth nervures; feet greenish; anterior and intermediate pairs of thighs biannulate with blackish, posterior pair tipped with dusky; tergum with the posterior edge of the incisures black; setæ immaculate.

Length nearly three-tenths of an inch.

The small black spot on the middle of the costal margin is very obvious. The abdomen at tip is more or less obviously ferruginous.

2. *B. arida*. Brownish; posterior pairs of feet and setæ white.

Inhabits Indiana.

Body reddish-brown, with dusky incisures; head rather prominent, whitish, varied with ferruginous; vertex with a small black spot each side on the orbit; eyes rufous, with a whitish vitta; stemmata prominent, approximate; anterior one nearly as large as the others; wings immaculate, inferior pair more than one-third the length of the other; anterior tibiæ whitish, obscure at base and tip; posterior pairs of feet and setæ greenish-white; tergum with the posterior margins of the segments

Length two-fifths of an inch.

It occurs about the middle of June.

3. *B. verticis*. Yellowish-white; head and double thoracic vitta ferruginous.

Inhabits Indiana

Body yellowish-white; head sessile; vertex ferruginous; thorax with two ferruginous vittæ, confluent before, and becoming obsolete behind; wings with the nervures, except those of the margin,

black; inferior wings not extending beyond the fourth abdominal segments; setæ hardly longer than the body, the incisures black; feet white; anterior thighs ferruginous at tip; anterior tibiæ at tip, and their tarsal incisures, fuscous.

Length over one-fourth of an inch, of the setæ over three-tenths.

Caught on the window in August.

4. *B. obesa*. Body short; wings blackish, with a hyaline spot, and numerous smaller ones.

Inhabits Indiana.

Body very short and robust, blackish livid; wings dark brown or blackish, with numerous small, transverse, hyaline spots, or abbreviated lines, and a large hyaline, very oblique, semifacia about the middle on the anal half; inferior pair, excepting on the apical margin with numerous transverse, abbreviated, hyaline lines; abdomen with a dull, rufous, livid margin to the segments; setæ very short, hairy, with black incisures; feet pale yellowish; incisures of the tarsi black.

Length over three-tenths of an inch.

This species is not common.

The wings are longer than the body, and the setæ not longer than the abdomen.

EPHEMERA.

E. hilaris. Minute, white; stethidium pale fulvous; abdomen with three lateral points.

Inhabits Indiana.

Body white; eyes black, double; stethidium pale

fulvous; pleura and pectus with a few abbreviated dusky lines; wings two, ample, costal margin slightly dusky; abdomen depressed, with three brownish punctures on each side towards the tip; seta elongated.

Length one-tenth of an inch.

The smallest species I have seen. I caught several of them about the candle, on the evening of September 4th. They vary in having the brownish lines of the pleura and pectus obsolete, or altogether wanting.

FORMICALEO, Geoff.

1. *F. obsoletus*. Antennæ white in the middle; abdomen with white bands.

Inhabits U. S.

Head dull whitish, with a broad, dark, honey-yellow band between the eyes; antennæ fuscous, middle fourth whitish; thorax dull whitish; wings hyaline; anterior pair with a few obsolete, small, brownish spots or transverse abbreviated lines, two of which on the posterior margin are oblique, and a somewhat larger one on the costal margin near the tip; posterior pair with fewer spots, about three or four subcostal distant ones, and a large one on the terminal fourth, and a less obvious apical one; abdomen blackish, with a whitish band on each segment; beneath with a broad blackish vitta each side over the feet from the head to the abdomen; feet fuscous, posterior pair with a white annulus towards the tip, and at base and their tibia whitish.

Length of body about one inch.

This species is rather common.

2. F.? *grata*. Wings at tip varied with black and pale carneous.

Inhabits Indiana.

Body blackish; head and thorax varied with yellowish; wings, on the apical third, varied with flesh color, and a large trifarious, undulated, blackish mark; superior pair with a few blackish spots on the middle nervures, and on those of the anterior submargin; feet fuscous, with a yellowish line.

Length to the tip of the wings, about two inches.

This beautiful species is very rare.

A specimen was presented to me by Mrs. Corson; it was taken at her residence, near Evansville, Indiana.

The palpi in the specimen are deficient.

CHRYSOPA, *Leach*.

C. oculata. Pea-green; head and thorax spotted; tarsi brownish.

Inhabits U. S.

Antennæ pale brownish; first joint white, with a sanguineous band at base above, second joint black; eyes golden; palpi alternately black and white; labrum with two dilated sanguineous vittæ; between the eye and the mouth is a black, angulated line; base of the antennæ enclosed by two black circles; which are tinged with sanguineous above; above each antenna are two blackish spots, of which the anterior ones are sometimes confluent with the

circles of the antennæ; thorax with two series of three blackish spots in each, and two or three lateral spots; wings hyaline, iridescent, having the transverse nervures varied with black; tarsi pale brownish-yellow.

Length to the tip of the wings three-fifths of an inch.

This beautiful little insect is very common. When irritated, it diffuses a strong offensive odor, similar to that of human excrement. It is the analogue of the *C. perla*, L., with which I have hitherto confounded it, but, judging by Donovan's figure, it is never so large. Donovan says the *perla* stinks before a storm; our species has always that quality when irritated or alarmed.

*Summary of Meteorological Observations for 1836 ;
made in Fayette co., Tennessee, by M. RHEA.*

MONTHS.	Mean Temperature, Fah.								Rain gauge discontin'd.	Rain in inches.	No. of Snows.	Fair days.	Rainy days.	Cloudy days.	Wind from N. and N. W.	Wind from S. and S. E.	Wind from W. and S. W.	Wind from E. and N. E.	Various.
	Sunrise.	1 o'clock.	Sunset.	Of the month.	Greatest daily verge.	Highest each month.	Lowest each month.	Greatest monthly range.											
January,	31	38	35	34	22	51	8	43		1	14	11	6	16	10	1	1	3	
February,	33	49	41	41	32	67	12	45			16	6	7	14	4	7	1	3	
March,	39	56	45	46	36	78	20	58		2	13	12	6	12	10	1		8	
April,	57	75½	65½	66	34	89	40	49	7.40		12	6	12	4	15	1		10	
May,	62¾	83¼	73¼	73	26	90	50	40	3.20		12	12	7	11	7	1		12	
June,	66	79	72	72½	20	88	60	28	8.10		11	12	7	13	5	7		5	
July,	71	84	78	77	21	91	65	26	2.10		13	9	9	7	6	6		12	
August,	72	84	73	76	26	93	50	43			10	13	8	8	10	3	2	8	
September,	68	81	74	74	25	88	44	44			14	10	6	4	14	5	1	6	
October,	47	68	55	55	40	78	33	45			13	7	11	13	3	5	3	7	
November,	37	51	44	44	31	65	21	44		1	12	8	10	7	12	1	10		
December,	31	44	37	37	32	57	6	51		1	14	9	8	11	12	4	1	3	
Of the year.	51	66	58½	58½						5	154	115	97	120	96	55	10	87	
Jan. 1837.	36¾	43	35¾	35¾	33	66	11	55	1.60	3	12	3	13	14	8	4		5	

Monthly range of barometer, 1.91 inches.

The months of January, February, March, and first part of April, were unusually wet and unpleasant, with strong winds from S. E. and N. W, and much thunder in February. This latter month was remarkable, in the early part of it, for excessive cold in East Tennessee. The thermometer then ranging here from 12 to 40 degrees at sunrise. Great rain fell here on the 12th and 25th of February, that on the latter from the N. E., an uncommon

occurrence. On the 9th of March, five inches of snow fell, and on the 17th, at 4 o'clock, A. M., a violent storm blew up from the S. W., with one inch of rain. Throughout the latter part of April, May, June, July, August, and September, the weather was uniformly pleasant and favorable for agriculture. Frequent showers from thunder clouds, with brisk winds, occurred, particularly in June, some of which were very heavy. The latter part of July, and the whole month of August, were remarkable for a deleterious atmosphere, which produced much bilious disease, and nervous derangement. The first white frost occurred on the last night of September. The first ice was seen on the morning of the 5th October. The months of October and November, although cool, were uncommonly pleasant and favorable for gathering crops of corn, cotton, &c. The health of the country was also good.

During the month of December, the weather was attended with great and sudden changes. Seven of which, from warm to cold, occurred within the month. The thermometer fell from 56 degrees at noon, on the 20th, to 6 degrees at 6 o'clock., A. M., of the 21st, a period of 18 hours.

With the beginning of the new year, the weather assumed a more mild and uniform tenor, and remained so during the whole month of January. The greatest proportion of the weather was cloudy, but rains were few and very slight. Three light snows fell, which soon disappeared. General good health prevailed.

AURORA BOREALIS.

This phenomena, so unusual in southern latitudes, was presented here on the night of the 25th of January past, with a grandeur and effulgence which, perhaps, surpassed any appearance of the kind ever witnessed as far south as the 35th degree.

The aurora of the 17th of November, 1835, is well recollected by the inhabitants of this country as a phenomena entirely unusual. The corruscations of light at that time were confined mostly to the neighborhood of the northern horizon, and were but imperfectly defined in their outlines. The color of the luminous clouds was but little varied, exhibiting a pale colored appearance. The changes were slow, and hardly discernible.

The aurora, of the 25th of January, presented much of the quick and beautiful changes peculiar to this phenomena in the high latitudes. The morning was cloudy until 9 o'clock. The day afterwards was clear and very fine, a gentle wind blew from the west. The thermometer stood at 27 degrees at sunrise, and 32 at sunset. Barometer 29.70 inches at sunrise, and 29.40 at sunset. As daylight declined, a bright, pale colored light was observed in the northern horizon, surmounted by a broad, irregular, crimson colored arch, extending twenty or more degrees on each side of the pole, from the vertex of which pale luminous, transparent pillars rose perpendicularly, reaching nearly to the zenith. The pillars seemed continually to be melting away into thin, red, transparent clouds, which

moved off with considerable velocity to the east and west. At 9 o'clock, when the moon rose, the arch had entirely disappeared, and the horizon, in that direction, wore an uncommonly dark appearance, except where illuminated by the pale colored pillars, which still continued to shoot up towards the zenith, fringed, as before, with red clouds. Borders of transparent red clouds were then gathered in the north-east and north-west, the former of which was particularly red and luminous, and remained stationary for some hours, giving out light, flying clouds of the same color, which soon disappeared. As the night advanced, the light continued to grow dimmer and more confused in form and color, until the whole disappeared entirely.

The weather, for some time previously, had been uncommonly pleasant for the season, except a slight snow on the morning of the 24th. On the day succeeding the aurora, the weather was fine. The thermometer stood at 22 degrees at sunrise, and 34 at sunset. The barometer at 29.54 inches at sunrise, and 29.10 at sunset. No rain fell until the 7th of February, except a slight shower on the 30th. The weather remained fair and unusually pleasant and warm, with brisk winds from the S. and S. E. On the 3d of February, hazel bushes were in bloom, and doves and frogs were heard singing; the thermometer for some days ranging from 30 to 60 degrees.

Description of five New Fossils, of the Older Pliocene Formation of Maryland and North Carolina.
By WM. WAGNER.

Read January 2d, 1838.

PECTEN *Marylandicus*. Pl. 1, fig. 1.

Shell ovate, compressed; ribs numerous, consisting of narrow, nearly smooth striæ, disposed in pairs; interstitial spaces each with a carinated line; ears unequal; inferior valve very slightly convex; ribs similar to those of the opposite valve; inner margin of the valve with profoundly elevated lines.

Locality. Meherring river, North Carolina. This Pecten is allied to PECTEN *Madisonius*, Say, but can readily be distinguished by its want of broad, elevated ribs, and a surface destitute of scales; several specimens of SPIRORBUS *nautiloides*, Lam., are attached to the surface of the superior valve.

VENUS *inoceriformis*. Pl. 1, fig. 2.

Shell oblique, suborbicular, thin and fragile, ventricose; disks with unequal, concentric undulations, forming prominent angulated carinæ; concentric striæ numerous, prominent; beaks prominent; no distinct lunule; cardinal teeth lamellar.

Locality. Banks of St. Mary's river, Maryland. This beautiful Venus is very similar in the exterior to some species of Inoceramus, which character has suggested the name. One specimen alone has

hitherto been found; this I obtained on a visit to Porto Bello, on St. Mary's river, Maryland.

PANOPEA Goldfussii. Pl. 1, fig. 3.

Shell oblong, subovate, ventricose; disks with concentric, unequal, shallow grooves; lines of growth coarse and prominent; anterior extremity slightly gaping; anterior margin rounded, anterior dorsal margin elevated; posterior side narrowed, somewhat produced, not reflected; posterior dorsal margin nearly rectilinear; cardinal teeth obliquely compressed, united at base to the nympha, short and not very prominent.

Locality. Mehering river, North Carolina. Allied to *PANOPEA reflexa*, Say, from which it differs in being proportionally more elongated, and without reflected margin, in being nearly closed anteriorly, and in having a straight dorsal line.

MYSIA nucleiformis. Pl. 1, fig. 4.

Shell suborbicular, ventricose, lines of growth very distinct on the inferior half of the disk; posterior margin direct.

Locality. Mehering river, North Carolina.

TROCHUS eboreus. Pl. 1, fig. 5.

Shell smooth and slightly polished; spire short, conical; whirls flattened laterally, margined above by a very obtuse obsolete carina; spiral lines ob-

solete; periphery sharply angulated, subcarinated; base flattened; subumbilicated columella grooved; aperture half the length of the shell.

Locality. Banks of the Patuxent river, Maryland.

This species is remarkable for its smooth surface, and white, ivory-like appearance. It is rare.

A few Facts in relation to the Identity of the Red and Mottled Owls, &c. By EZRA MICHENER, M. D.

Read July 3d, 1838.

It is an extraordinary fact that, up to the present time, the identity of the red and mottled owls should not have been satisfactorily settled. Notwithstanding the imposing authorities of Buonaparte, Audubon, and Nuttall, and their extensive opportunities for observation, and the very general concurrence of other able ornithologists on the affirmative side of the question, I still think there is cause to doubt the correctness of their conclusion. I have long doubted the identity of those birds, and within the last four years have several times invited the attention of individual members of the Academy to the subject.

My observations, indeed, removed any doubt in the case, and I unhesitatingly restored Wilson's

specific name—*naevia*—to the gray or mottled owl in my collection four years ago.

I am indebted to a friend for extracts from a Boston journal, in which Samuel Cabot, jr., contends for the identity of the two birds, but reverses the priority of age, so as to make the mottled the young of the red owl. His testimony, however, does not change my opinion as already expressed, that the red and mottled owls are specifically distinct.

I will briefly state the facts on which this opinion is founded.

In early life, I have sometimes seen broods of young screech-owls accompanied by their parents after leaving the nest. I have seen them both red and gray, but never saw the two colors in company, nor have I ever heard any of my friends mention such an occurrence.

In the spring of 1833, some boys brought me two very young screech-owls, whose only covering was a grayish-white down. One of them was much less than the other, and soon died. The survivor began to put forth feathers in a few days, all of which came from the sheaths red. I had not an opportunity of seeing the parent bird, but the boys said that they had several times caught her on the nest, and that she was "as red as a fox." The conclusion, then, is certain, that red parents have red young. Unfortunately, my bird died when about six months old.

During the summer of that year I commenced forming a cabinet of birds, in which I was assisted by my kind friend, J. K. Townsend, who was wit-

ness to, and can attest the truth of most of the facts which I have to state.

Sixth mo. 17th, 1833.—Found a company of four gray or mottled owls, two of which were in full plumage, the other two were young. I killed one of the old, and the two young ones. The former, and one of the latter, are now in my cabinet; the other, I believe, is still in the possession of John K. Townsend. These birds, both old and young, were unequivocally mottled owls, without the slightest shade of red about them. The young ones were, moreover, about the size and age, and in the same state of plumage with my living red owl, affording an excellent opportunity for comparison. In the one, every feather was more or less red; in the other, no shade of red appeared. The mottled parent, therefore, has mottled young. Thus both the old and the young are sometimes red, sometimes mottled.

The conclusion is, therefore, evident, either that the color of both old and young is variable and uncertain, or that they are specifically distinct. But with the single exception of Cabot's birds, the young appear to partake of the color of the parent; nor is there any analogy among the owls to sustain a different opinion. Hence I have adopted the opinion that they are essentially different.

With the exception of the young birds, I have not had an opportunity to compare recent specimens, and am unable to indicate any specific characters by which they can be distinguished, except color. But as this appears to be permanent in both

old and young, it ought to be deemed sufficient. I believe that the mottled bird may be rather smaller than the red one, as noticed by Cabot, but of this I am not certain. A careful comparison would, probably, discover other distinguishing characters.

I will conclude with a few facts in relation to the habits of owls.

My pet red owl drank frequently, and was accustomed to wash every day in a basin of cold water, during the heat of summer.

It has been stated that one of the young owls was much less than the other when taken from the nest. It appeared to be very young, would not feed, and soon died. At the time, I was at a loss to account for the difference. On a subsequent occasion, I found a long-eared owl on her nest, and shot her. The nest contained four young birds and one egg. The birds were all of different sizes, and evidently of ages corresponding. The larger one was at least twice the size of the smaller. The chick in the egg was alive, and nearly ready to be excluded from the shell. In both these cases, therefore, it appears that the eggs must have been hatched at different times,—perhaps in the order of succession in which they were laid.

I think this curious circumstance may be explained by supposing that the parent continues to sit on the nest, at least during the day, from the time she commences laying her eggs.

It would be curious to know whether this mode of incubation may not be common to all the owls, or at least to those of a nocturnal character.

Description of several New Species of American Quadrupeds. By Rev. J. BACHMAN, of Charleston, S. C.

Read August 7th, 1838.

Mr. J. K. TOWNSEND having placed at my disposal, for examination and description, his valuable collection of quadrupeds, obtained in his recent laborious and perilous journeys over the Rocky Mountains, and along the western borders of our continent, I proceed to give short descriptions of such as appear to be undescribed, or have been incorrectly referred to other known species. As the different species included under the genera to which they belong, are not generally described with the accuracy required in the present state of the science, I commenced preparing detailed descriptions of all the species. Although these papers are nearly ready for publication, yet the drawings are not completed, and as these are very important in many species, I have concluded to defer submitting them to the Society for a few months. In the mean time, as an act of justice to their discoverer, I proceed to establish the species at once; reserving a more careful and scientific description to a future, but I hope not distant period. As I have not had an opportunity of consulting the recent scientific journals of Europe, it is possible that some of our enterprising naturalists abroad may have already published the

species here described ; if so, I shall be content that my names shall stand as synonyms.

1. SCALOPS *Townsendii*. Townsend's Shrew Mole.

Scalops canadensis, Richardson. Fauna Boreali Americana, p. 9.

This species, first described by Dr. Richardson, was incorrectly referred to the common shrew mole of the United States. Its size and dentition are sufficient evidences of its being a new and distinct species ; which, on account of the number and arrangement of its teeth, will either require the characters of the genus to be enlarged, or that it be placed under a new sub-genus. A specimen of this quadruped was kindly presented to me by Mr. Nuttall, who requested that, in case it should prove a distinct species, it might be given under the above name. I subsequently received from Mr. Townsend another specimen, a little larger in size, which I presume to be a mere variety, although very singularly marked.

Description of Mr. Nuttall's Specimen.

Length of the head and body, 7 inches 6 lines.

“ “ tail, 1 “ 6 “

Breadth of the fore palm, 7 “

Dental formula.—Incis. $\frac{3}{4}$. False molars, $\frac{12}{13}$. True molars, $\frac{8}{9}$, 44.

The body is thick and cylindrical, shaped like the shrew mole of the United States. The whole upper and under surface is of a dark color, in most

lights appearing black. The hair, when blown aside, exhibits a grayish-black color from the roots to near the tips. The tail is slightly clothed with short, strong bristles.

The specimen brought by Mr. Townsend is thicker, and about an inch longer. It has a white stripe, about two lines wide, commencing under the chin, and running in a somewhat irregular line along the under surface of the body to within an inch and a half of the insertion of the tail; there is also a white streak commencing on the forehead, and extending along the snout.

The specimen of Mr. Townsend is labelled "Banks of the Columbia river, May 9th, 1835."

The body of the *SCALOPS canadensis* is from five to five and a half inches in length. Its color, although occasionally variable, is uniformly much lighter than that of the present species. The adult of the former also has thirty-six teeth, as I have ascertained from an examination of many specimens, and in this respect their characters are correctly given by F. Cuvier. From a skull of the adult *S. canadensis*, Dr. Harlan evidently formed his *S. Pennsylvanica*, which, I think, cannot be continued as a true species. The specimen which he described as the *SCALOPS canadensis*, as well as those of Desmarest and Griffith, were young animals, which all present the same deficiency of teeth, as also the wide edentate spaces which they observed between the incisors and grinders. About one-half of the numerous specimens now before me, which I

know to be young animals have similar dental arrangements.

2. *ARVICOLA Townsendii*. Townsend's Meadow Mouse.

Body cylindrical; head rather small; whiskers nearly all white, intermingled with a few black hairs; eyes small; teeth large, yellow; ears large, broad, extending a little beyond the fur; feet of moderate size; toes like the rest of this genus; thumb protected by a rather short, acute nail; fur on the back about three lines long, much shorter beneath; tail scaly, sparingly covered with soft, brown hair, a few white hairs at its extremity; feet clothed to the nails with short, brown, adpressed hairs; claws brown; fur above lead color from the roots to near the tips, which are dark brown; beneath cinereous.

Length of head and body,	6	inches	0	lines.
“ tail,	2	“	6	“
Fore feet to point of nails,	0	“	9	“
From heel to point of nail,	1	“	0	“
Breadth of ear,	0	“	5	“

Of this species, which was a male, obtained by Mr. Townsend on the Columbia river, on the 21st July, 1835, I can find no description in Richardson.

3. *ARVICOLA oregoni*. The Oregon Meadow Mouse.

This diminutive species is another of the discoveries of Mr. Townsend.

Head of moderate size; body slender; eyes very small for this genus; ears nearly naked, concealed by the fur; feet small; whiskers the length of the head, white and black, the latter predominating; color above, a shade lighter than that of the former species, inclining a little to hoary brown; ash colored beneath; a very minute, blunt, thumb nail on the fore foot.

Length of the head and body, 3 inches 0 lines.

“ “ tail, 1 “ “ 2 “

The above was an old male, captured at the Columbia river, November 2d, 1836.

4. SPERMOPHILUS *Townsendii*. Townsend's Marmot.

Spermophilus guttatus, Richardson.

This singularly marked and, I conceive, new species, is another of the discoveries of our indefatigable countryman, Mr. Townsend. In a letter to me, he states, “That it inhabits, in the summer, the prairies near the Walla-walla; is rather common. It becomes excessively fat, and is eaten by the Indians. It disappears in August, and reappears early in spring, in a very attenuated state.”

The body is long, and rather slender; head of a moderate size; nose slightly obtuse; ears short, scarcely a line in height; nails slender, compressed, and slightly arched; the thumb protected by an acute and prominent nail; the second claw in the fore foot, as in all the species of this genus, is longest, and not the third, as in the squirrels. Cheek pouches not large; tail thickly clothed with fur,

and in the dried specimen appears much flattened; the fur is soft, smooth, and lustrous.

There is a line of white above and beneath the eye-brows. The fur on the whole of the upper surface, is for one-fourth of its length from the roots of a nearly black color, then a broad line of silver-gray, then a narrow line of dark brown, edged with yellowish-white, with a few black hairs interspersed, giving it a brownish-gray appearance. On the under surface, where the hair is a little longer than on the back, it is black at the roots, and cinereous at the points; on the forehead and nose it is slightly tinged with brown. The line of separation between the colors of the upper and the under surface, exists high up along the sides, and is very distinctly drawn. The tail, on the upper surface, is the color of the back; slightly tinged with brown beneath; the teeth are white.

Length of the head and body,	8 inches 9 lines.
“ “ head,	1 “ 10 “
“ “ tail, (vertebræ,)	1 “ 0 “
“ “ “ including fur,	1 “ 6 “
Length from heel to end of middle hind claw,	1 “ 4 “

This species bears some resemblance to the tawny marmot, (*S. Richardsonii*), with which I have compared it, as also to the American souslik, (*Arctomys. *Spermophilus guttatus*, Richardson*), but is evidently distinct from either.

5. *SCIURUS Douglassii*, Bennett. *S. Townsendii*,
nob. Douglass's Squirrel.

This species, in the form of its body, is not very unlike the *SCIURUS hudsonicus*; its ears and tail, however, are proportionably much shorter; it is about a fourth larger, and, in its markings, differs widely from any other known species.

Head considerably broader than that of the *SCIURUS hudsonicus*; nose less elongated, and blunter; body long and slender; ears rather small, nearly rounded, slightly tufted posteriorly. As usual in this genus, the third inner toe is the longest, and not the second, as in the *Spermophilus*.

Color.—The whiskers, which are the length of the head, are black. The fur, which is soft and lustrous, is, on the back, from the roots to near the points, plumbeous, tipped with brownish-gray, with a few lighter colored hairs interspersed, giving it a dark brown appearance; when closely examined, it has the appearance of being thickly sprinkled with minute points of rust color on a black ground. The tail, which is distichous, but not broad, is for three-fourths of an inch of the color of the back; in the middle, the fur is plumbeous at the roots, then irregular markings of brown and black, tipped with soiled white, giving it a hoary appearance; on the extremity of the tail the hairs are black from the roots, tipped with light brown. The inner sides of the extremities, and the outer surface of the feet, together with the throat and mouth, and a line

above and under the eye, are bright buff. The colors on the upper and under parts are separated by a line of black, commencing at the shoulders and running along the flanks to the thighs. It is widest in the middle, about three lines, and tapers off to a point. The hairs, which project beyond the outer margins of the ears, and forming a slight tuft, are dark brown, and, in some specimens, black.

Length from point of nose to the

insertion of the tail,	8 inches 4 lines.
Length of tail, (vertebræ,) 4 " 6 "	
" " including fur, 6 " 4 "	
Height of ear posteriorly, 0 " 6 "	
Sole and middle hind claw, 1 " 11 "	

Several specimens of the above squirrel, exhibiting scarcely any variation in color, were obtained by Mr. Townsend on the Columbia river. He remarks in his notes: "This is a very plentiful species, inhabits the pine trees in this neighborhood, and, like our common Carolina, lays in a great quantity of food for consumption during the winter months. This food consists of the cone of the pine, with a few acorns. Late in autumn, it may be seen very busy in the tops of the trees, throwing down its winter stock, after which, assisted by its mate, he gathers it in, and stores it away in readiness for his long incarceration."

6. *SCIURUS Richardsonii*. Columbia Pine Squirrel.

Small Brown Squirrel, Lewis & Clarke, Vol. III., p. 37.

Sciurus hudsonicus, var. (Columbia Pine Squirrel, Richardson.)

This small species was first noticed by Lewis

and Clarke, who deposited a specimen in the Philadelphia Museum, where it still exists. I have compared it with a specimen brought by Mr. Townsend, and find them identical. Richardson, who appears not to have seen it, supposes it to be a mere variety of the *SCIURUS hudsonicus*. On the contrary, Mr. Townsend says in his notes: "It is evidently a distinct species; its habits are very different from those of the *SCIURUS hudsonicus*. It frequents the pine trees in the high range of the Rocky Mountains, west of the great chain, feeding upon the seeds contained in the cones. These seeds are large and white, and contain a good deal of nutriment. The Indians eat a great quantity of them, and esteem them good. The note of this squirrel is a loud, jarring chatter, very different from the voice of *S. hudsonicus*. It is not at all shy, frequently coming down to the foot of the tree to reconnoitre the passenger, and scolding at him vociferously. It is, I think, a scarce species."

The difference between these two species can be detected at a glance, by comparing the specimens. The present species, in addition to its being about a fourth smaller, (the size of the *SCIURUS (Tamias) lysteri*,) has less of the reddish brown on the upper surface, and may be always distinguished from the other by the blackness of its tail at its extremity.

The body of this most diminutive of all the known species of genuine squirrel in North America, is short, and does not present that appearance of lightness and agility which distinguishes the *S. hudsonicus*. Head large, less elongated, and nose a

little blunter than *S. hudsonicus*; ears short; feet of moderate size; the third toe on the fore foot but slightly longer than the second. The claws are compressed, hooked, and acute; tail shorter than the body; the thumb nail is broad, flat, and blunt.

The fur on the back is dark plumbeous from the roots, tipped with rusty brown and black, giving it a rusty gray appearance. It is less rufous than the *S. hudsonicus*, and lighter colored than the *S. Townsendii*. The feet, on their upper surface, are rufous; on the shoulders, forehead, ears, and along the thighs, there is a slight tinge of the same color. The whiskers, which are a little longer than the head, are black; the teeth yellowish-white. The whole of the under surface, as well as a line around the eyes, and a small patch above the nostrils, smoke-gray. The tail, for about one-half its length, presents on the upper surface a dark rufous appearance, many of the hairs being nearly black, pointed with light rufous. At the extremity of the tail, for about an inch in length, the hairs are black, a few of them slightly tipped with rufous. The hind feet, from the heels to the palms, are thickly clothed with short, adpressed, light colored hairs; the palms are naked. The sides are marked by a line of black, commencing at the shoulder, and terminating abruptly on the flanks; it is about two inches in length and four lines wide.

Length of head and body,	6 inches 2 lines.
“ tail, (vertebræ,)	3 “ 6 “
“ “ including fur,	5 “ 0 “
“ ears posteriorly,	0 “ 3 “

Length of ears, including fur, 0 inches 5 lines.
 Sole and middle hind claw, 0 " 9 "

The specimen from which I have described is labelled "Rocky Mountains, August 12th, 1834."

7. *SCIURUS lanuginosus*. Downy Squirrel.

A singular and beautiful little quadruped, to which I have conceived the above name appropriate, was sent to me with the collection of Mr. Townsend. He states in his letter, "Of this animal I know nothing; it was killed on the coast near Sitka, and given me by my friend, W. F. Tolmie, Esq., Surgeon of the Honorable Hudson's Bay Company."

The head is broader than *S. hudsonicus*, and the forehead much arched; the ears short and oval; whiskers longer than the head; feet and toes short; thumb armed with a broad, flat nail; nails slender, compressed and acute; the third on the fore feet is the longest, as in the squirrels. The tail, which bears some resemblance to that of the flying squirrel, is composed of hairs a little coarser than those of the back, and much shorter than the body. On the fore feet the palms are nearly naked, the under surface of the toes being only partially covered with hair, but on the hind feet, the under surface from the heel even to the extremity of the nails, is thickly clothed with soft, short hairs.

The fur is softer, and more downy, than that of any other of our species, and the whole covering of the animal indicates it to be a native of a cold region.

The teeth are dark orange; whiskers brown; the

fur on the back, from the roots to near the extremities, light plumbeous, tipped with light-chestnut-brown, on the sides with silver-gray; there is a broad line of white around the eyes; a spot of white on the hind part of the head, a little in advance of the anterior portion of the ears; the nose is white, which color extends along the forehead till above the eyes, where it is gradually blended with the colors on the back; the whole of the under surface, including the feet and the inner surface of the legs, pure white. In the tail the colors are irregularly blended with markings of black, light brown, and white, scarcely two hairs being uniform in color. In general, it may be said, that the tail, when examined without reference to individual hairs, is light ash at the roots of the hairs; then a broad, but not well defined line of light rufous, then dark brown, and tipped with rufous and smoke-gray.

Length of head and body,	7 inches 11 lines.
“ tail, (vertebræ,)	4 “ 8 “
“ “ including fur,	6 “ 0 “
Palm and middle fore claw,	1 “ 0 “
Sole and middle hind claw,	1 “ 9 “
Length of fur on the back,	0 “ 7 “
“ “ at the tip of the tail,	1 “ 10 “
Height of ear measured posteriorly,	0 “ 5 “
Distance between the orbits,	0 “ 6 “

8. *TAMIAS Townsendii*. Townsend's Ground Squirrel.

This species bears some resemblance to our common ground squirrel of the middle and northern

states, (*S. lysteri*,) it differs from it, however, in its larger size, longer tail, and several other striking particulars.

The body is stouter than that of the former species, the head broader, the nose more obtuse, and the tail nearly double the length. In the arrangement of the teeth and toes, this species does not differ widely from the *S. (Tamias) lysteri*, except that they are more robust. The teeth are dark orange; whiskers, which are a little shorter than the head, black; a line of fawn color, commencing at the nostrils, runs over the eye brows, and terminates a little beyond them in a point of lighter color; a patch of similar color commences under the eye-lids, and running along the cheeks terminates at the ear.

There is a line of dark brown commencing at the termination of the nose, where it forms a point, and, bordering the fawn color above, is gradually blended with the lighter colors of the head. The ears, which are of moderate size, and ovate, are on the upper margins of the inner surface partially clothed with a few short, brown hairs; the outer surface is thickly clothed with fur, brown on the anterior parts, with a patch of white covering about one-fourth of the ear on the posterior portions. Behind the ear, there is a slight marking of cinereous, of about six lines in length, terminating near the shoulder. A line of black commences on the hind part of the head, runs over the centre of the back, where it spreads out to the width of four lines, and terminates in a point at the insertion of the tail; a line

of similar color commences at the shoulders, and running parallel, terminates a little beyond the hips; another, but narrower and shorter line, of the same color, runs parallel with this, low down on the sides, giving it five black stripes. The head and back are light yellowish-brown, presenting on the upper surface a dusky-ochre color. It has not the whitish stripes on the sides, nor the rufous color on the hips, which are so conspicuous in the *SCIURUS (Tamias) lysteri*. On the throat, belly, and inner parts of the legs and thighs, the color is light cinereous; there is no line of separation between the colors of the back and belly. The tail, which is not bushy, is on the upper surface grayish-black, having a hoary appearance. Underneath it is reddish-brown for two-thirds of its breadth, then a narrow line of black, tipped with light ash. The nails are brown.

Length of the head and body,	6 inches 9 lines.
“ “ tail, (vertebræ,)	4 “ 0 “
“ “ “ including fur,	5 “ 0 “
“ of head,	2 “ 0 “
Height of ear,	0 “ 6 “
Length of heel to middle claw of	
the hind foot,	1 “ 6 “

Mr. Townsend states in his notes: “This pretty little fellow, so much resembling our common *striatus*, is quite common. It lives in holes in the ground; running over your foot as you traverse the woods. It frequently perches itself upon a log or stump, and keeps up a continual clucking, which is usually answered by another at some distance,

for a considerable time. Their note so much resembles that of the dusky grouse, (*T. obscurus*,) that I have more than once been deceived by it.

9. *TAMIAS minimus*. Least Ground Squirrel.

This diminutive and beautiful species of *tamias*, not half the size of the common ground squirrel, is another of the discoveries of Mr. Townsend. He says in his notes: "It is found very plentiful along the banks of the Rio Colorado, but, I think, does not inhabit a very extensive range, as I never saw it after leaving this river. It keeps almost constantly among heaps of stones, on the tops of which it often perches, extending its long tail over its back, and curving it over in front of its head. At such times it emits a lively, garrulous note, like the squeaking of a young puppy, but, if approached, darts off with astonishing swiftness, carrying the tail level with the ground, and almost eluding the eye by the activity of its motions, and conceals itself under some jutting rock, or in the interstices of a stone heap, until the intruder has passed."

Length of head and body, 3 inches 9 lines.

" " tail, (vertebræ,) 3 " 2 "

" " " to the end of fur, 4 " 0 "

Height of ear posteriorly, 0 " 24 "

Length of head, 1 " 3 "

Of heel to end of middle claw, 1 " 0 "

The head is rather small; the nose very sharp pointed; claws moderately curved, compressed,

acute, and dark brown. There is, as in all the species of this genus, a minute, blunt nail on the thumb. The feet and legs rather long in proportion to the size of the animal.

The fur is soft to the touch, fine and silky. The teeth, which are not robust, are yellow. A white streak runs from above and behind the eye to the nostrils, giving the nose a sharp and pointed appearance. This white line is marked on the upper surface with an edge of brown; a minute line of rufous runs from the nose through the eye, terminating at the ear, another, commencing under the eye, and running parallel with the last, terminates on the neck; a line of black, commencing on the forehead, extends over the back, and terminates at the tail; this is succeeded on each side by a broad line of whitish ash, then by a narrower line of brown commencing back of the neck, and running parallel with the rest, till it is narrowed to a point on the hips; this is succeeded by a line of pure white on each side, similar to the last, and, finally, by a broader and shorter stripe of brown; giving it on the back one stripe of black, two of light ash, and four of light brown. The head is cinerous; the ears have a white spot on their posterior surface, similar to the last species, and also to another described by Say, as the *SCIURUS quadrivittatus*, with which I have compared it. The neck, and whole of the under surface, including the legs and thighs, are white. The tail, which is quite narrow, is dark brown above, edged with light rufous. Beneath, it is rufous near the roots, then a line of black, edged

with light rufous; from the end of the vertebræ to the extremity, the hairs are black, a few of them are tipped with light rufous.

The number of species under the subgenera *Spermophilus* and *Tamias*, and the uniformity of character which they present, would, I conceive, warrant us in adopting them as true genera.

List of Quadrupeds procured by Mr. Townsend, and sent to the Academy of Natural Sciences.

1. *Scalops Townsendii*, (described above.)

2. *Meles labradoria*.

3. *Mustela (putorius) ermina*?

This specimen is in summer colors. The feet are white, possibly the commencement of a change to its winter pelage.

4. *Canis*.

5. *Arvicola Townsendii*, (described as above.)

6. *Arvicola oregonii*, (described as above.)

7. *Neotoma Drummondii*.

8. *Mus leucopus*?

Several very striking varieties, if not new species.

9. *Meriones labradorius*.

This quadruped is correctly described by Richardson. In the specimen originally noticed by Sabine, the tail was short, which has been given as one of its characters. The tail, however, is even longer than that of the *GERBILLUS canadensis*, and it is believed that in the specimen of Sabine the tail had been mutilated, an accident very common to the whole family of rats.

10. *Spermophilus Douglassii*—four specimens of various sizes.

11. *Spermophilus Franklinii*.

12. *Spermophilus Richardsonii*.

13. *Spermophilus Townsendii*, (described above.)

14. *Spermophilus tridecem-lineatus*.

15. *Tamias quadrivittatus*. (Say.)

16. *Tamias Townsendii*, (described above.)

17. *Tamias minimus*, (described above.)

18. *Sciurus Douglassii*, (Bennett,) (described above.)

19. *Sciurus Richardsonii*, (described above.)

20. *Sciurus lanuginosus*, (described above.)

21. *Pteromys Sabineus*—one specimen.

22. *Geomys borealis*. (Richardson.)

23. *Geomys Townsendii*—two specimens. (Richardson's manuscripts.)

24. *Lepus Townsendii*,—two specimens.

25. *Lepus artemesia*,—seven specimens.

26. *Cervus leucurus*. A fawn, resembling very strongly that of *CERVUS virginianus*.

27. *Pteromys oregonensis*,—one specimen.

Additional Remarks on the Genus Lepus, with corrections of a former paper, and descriptions of other species of Quadrupeds found in North America. By JOHN BACHMAN.

IN a note contained in the last volume of the Transactions of the Academy of Natural Sciences, (page 403,) I stated that "I was induced to think that I had been led into an error in the synonyms of two of the species of *Lepus*. I had followed too confidingly the works of Desmarest, Cuvier, and those of American naturalists who copied their errors, in referring our common gray rabbit to *LEPUS americanus*, and had no opportunity of consulting the work of Erxleben, the original describer of that species, before the article was in print. I, however, felt pretty confident, from the original account given of the northern hare in the 62d volume of the London Philosophical Transactions, that it would prove to be the *LEPUS americanus* of Erxleben, and identical with the species which was afterwards published as *LEPUS virginianus*, and I consequently inserted a note to that effect. Having since enjoyed ample opportunities of satisfying myself that my conjectures were right, I find it necessary to correct some of the synonyms in that article, and at the same time to add such information on the different species of this genus as I have since been able to collect.

1. *LEPUS glacialis*, (Leach,) Polar Hare.

LEPUS glacialis, Leach, Ross' Voyage. *L. glacialis*, Supplement to Captain Sabine. *L. glacialis*, Parry's First Voyage, p. 188. *L. glacialis*, Franklin's Journal, p. 662. *L. glacialis*, Parry's Second Voyage, p. 321; Harlan's Fauna, p. 194. *L. glacialis*, Journ. Acad. Nat. Sci., Vol. VII., p. 285. Plate, in summer colors, 21.

2. *LEPUS americanus*, (Erxleben.) Northern Hare.

LEPUS americanus, Erxleben's Systema Regni Animalis, p. 330: A. D. 1777. American Hare, London Philosophical Transactions, Vol. LXII., pp. 11 and 376. *LEPUS hudsonius*, Pallas glires, pp. 1 and 30. *LEPUS virginianus*, Harlan's Fauna, p. 196: A. D., 1825. *LEPUS virginianus*, Naturalist's Miscellany, Doughty's figure in autumn pelage, Vol. I., p. 217, plate 19. Audubon's Birds of America, Vol. II., plate 181, winter dress: in the talons of *FALCO chrysactos*.

Since my last article on the hares was published, I have had an opportunity of consulting the work of Erxleben, which has satisfied me with regard to his description of this species. He describes it very correctly as "*magnitudine medius, inter L. cuniculum, et timidum alpinum.*" Our gray rabbit, instead of being intermediate between the *L. cuniculus*, the common domesticated rabbit of Europe, and the Alpine hare, is smaller than either. "*Pedes postici longiores quam in L. timido et cuniculo.*" These long hind feet are distinctive marks of the northern hare, but those of our gray rabbit are much shorter than those of the *L. timido*, or common hare of Europe. "*Hieme in frigidioribus*

albus." Our gray rabbit, contrary to the assertion of most authors, does not become white in winter, in any latitude. "Habitat in America boreali, et fretum Hudsonium copiossimus." Dr. Richardson, and every northern traveller with whom I have conversed, have assured me that our gray rabbit does not exist at Hudson's Bay, where the northern and polar hares are the only species to be found. The original specimens sent from Hudson's Bay, from which Foster drew up his description in the 62d volume (p. 276) of the London Philosophical Transactions, became eaten up by insects, but have been regularly replaced in the British Museum by others, which I have examined, as well as the original specimens described by Richardson; they are our northern hare, in winter colors, and are all marked *LEPUS americanus*. In fact, our little gray rabbit is very little known in England or Scotland, since, after an examination of all their principal museums, I met with but two specimens, much mutilated, one of which was not named; the other was very properly marked *LEPUS americanus*, Harlan non Erxleben. The rule of priority to which all naturalists are strictly bound to adhere, must, therefore, preserve for the northern hare the name of *LEPUS americanus*, whilst that of *L. virginianus* must stand as a synonym.

In page 308 of the Journal of the Academy, Vol. VII., I stated on the authority of Lewis & Clarke, and Drummond and Richardson, that this species existed on the shores of the Pacific. I have since ascertained that they mistook the species for a very different one, which I designated in p. 349, under

the name of *LEPUS campestris*. The habit spoken of by Dr. Richardson, of its frequenting open plains and not thick woods, must therefore be referred, not to our northern hare, (*L. americanus* et *L. virginianus*, Harlan,) whose habits are very different, but to the prairie hare, (*L. campestris*.) The northern hare has not been found on either side of the Rocky Mountains, but appears to be restricted to the northern parts of the United States, the Canadas, Hudson's Bay, and the countries on the north-eastern coast of America, to the south of lat. 64, 30.

3. *LEPUS sylvaticus*, (nob.) Gray Rabbit. American Hare.

LEPUS sylvaticus, Journal Acad. Nat. Sci., Vol. VII., part 2, p. 403: A. D. 1837. *LEPUS americanus*, Cuv. Regne Animal. *LEPUS americanus*, Desmarest's Mammalogie, p. 351. *LEPUS americanus*, Harlan's Fauna, p. 93. *LEPUS americanus*, Godman, Vol. II., p. 157. Audubon's Birds of America, Vol. II., plate 51, in the talons of *FALCO borealis*.

The range of this species must now be considerably restricted from that which has been assigned to it by authors. It does not appear to exist farther north than the New England states, and has not been found to the west of the Rocky Mountains, where it is replaced by other species.

4. *LEPUS aquaticus*, (nob.) Swamp Hare.

LEPUS aquaticus, Journal Acad. Nat. Sci., Philadelphia: p. 319, plate 22, No. 2. Read March 21st, 1837.

From specimens received from Alabama since

my account of this species was published—one of which is deposited in the collections of the Academy of Natural Sciences of Philadelphia,—I have ascertained that the adult of this species is considerably larger than I represented it, being intermediate in size between the northern and polar hares.

5. *LEPUS palustris*, (nob.) Marsh Hare.

LEPUS palustris. Read before the Acad. Nat. Sci. of Philadelphia, May 10th, 1836. Transactions Society, Vol. VII., pp. 194 and 336. *LEPUS Douglassi*, (Gray.) Read before the Zoological Society of London, November, 1837. *LEPUS palustris*, figured in Audubon's fourth volume of plates of the Birds of America.

To this species I have no farther information to add, than that it has since been found to exist plentifully in Texas, where it was found by Audubon, and where the specimen described by Mr. Gray, of the British Museum, was also procured by Douglass.

6. *LEPUS Nuttallii*, (nob.) Nuttall's Little Hare.

LEPUS Nuttallii, Journal Acad. Nat. Sci., p. 345, pl. 22.

To the information already given on this species, (Vol. VII., Journ. Acad. Nat. Science, from p. 45 to 48,) I subjoin a note which was kindly furnished me by Mr. Townsend. "The specimen from which you described, was doubtless that of an adult animal. We saw, perhaps, twenty or thirty, and all the same size; several of the hunters and

trappers, attached to our party, who had perambulated the country for years, and were acquainted with, perhaps, every animal in it, said that it never attained a greater size. It is remarkably gentle, hopping before you like a domesticated animal."

7. *LEPUS campestris*, (nob.) Prairie Hare.

LEPUS campestris, Journal Acad. Nat. Sciences, Vol. VII., part 2, p. 349: A. D. 1837.

In my former article I offered reasons for believing this animal distinct from the northern hare, (*L. americanus*, Erx., and *L. virginianus*, Harlan,) to which my friend, Dr. Richardson, had referred it. I felt confident of this from the accuracy with which he was in the habit of describing his specimens. I have recently had an opportunity of ascertaining that I was correct in separating this species from our northern hare. Dr. Richardson, who holds an honorable station at Portsmouth, in the service of the government, had the kindness to visit me at London, and brought with him, among other rare specimens, that which, in his work, (*Fauna Boreali Americana*, p. 224,) he referred to the northern hare, (*L. virginianus*, Har., and *L. americanus*, Erx.) We were fortunate in having before us specimens of the polar, northern, and prairie hare, and were not at a moment's loss in determining that they were three distinct species. The error into which he had inadvertently fallen, may be easily accounted for. He was unacquainted with our gray rabbit of the United States, or else he would have saved naturalists the trouble of

correcting their synonyms. He had found the true *LEPUS americanus* of its first describer, in the northern hare, to which, by all our authors, our gray rabbit was referred, and he now sought for *LEPUS virginianus* of American writers, not suspecting that he had already found and described it under its true name of *L. americanus*.

The present species appears to be intermediate in size between the polar and northern hares, and although very distinct from either, approaches the former nearer than the latter. Its fur is soft and dense like that of the polar hare, but the hairs are not white throughout their whole extent, as in that species, having a narrow bar of brown in the middle, whilst all the remaining portions are white. The ears are shorter than those of the polar hare, but longer than those of the northern hare. From the northern hare (*L. americanus*, Erx.) it differs in its ears, which being an inch longer are marked by a decided black tip at their extremities, of an inch in breadth. The fur covering the ears is also shorter and more compact. There is a broad stripe of buff-yellow on the upper portion of the external surface of the ear, the hairs being sooty-brown at their roots; these markings are not found in the northern hare; the fur of the present species is whiter, and more compact than that of the northern hare, appearing, externally, snowy-white, without any admixture of fawn color, which is always visible through the loose covering of the other species. The fur of the northern hare is deep gray at the base, then broadly marked with yellow-

ish brown, and tipped with white; that of the present species is white at base and on the apical portion, and is only tinged in the middle with a narrow line of light brown. The summer color of the northern hare is reddish-brown above; that of the prairie hare, according to Lewis and Clarke, is lead color. The whiskers, in the specimens we compared, were in the latter species nearly all white, whilst those in the northern hare were nearly all black.

The fur on these three species, which interested us very much whilst engaged in comparing specimens, seemed perfectly adapted to the latitudes in which they are severally found to exist. That of the polar hare, which is found farthest north, was long, soft, and very dense, serving as a complete protection from the cold of the polar regions. That of the prairie hare, existing somewhat farther to the south, but still in a high northern latitude, was very compact, but shorter; whilst that of the northern hare, which is found as far south as the mountains of Pennsylvania, was much looser and thinner, indicating that the animal required less protection against the cold than either of the other species.

Mr. Townsend, in a private letter, remarks:—"I have frequently shot a hare on the Columbia river, both in summer and winter colors, but supposing it to be the old *americanus*, (northern hare,) I did not preserve a specimen." I have very little doubt but this will prove to be the species referred to in this article. It would be well, however, to compare specimens of the white hare found on the western side of the Rocky Mountains, with those on the Columbia river.

To the industry and persevering zeal of Mr. Townsend, and to the kind attention and liberality of the members of the Zoological Society of London, I am indebted for the privilege of adding to our North American Fauna the following additional species of hares.

8. *LEPUS longicaudatus*, (Gray.) Long-Tailed Hare.

LEPUS longicaudatus, (Gray.) Loudon's Magazine, Vol. I., New Series, p. 586, Nov. 1837.

Long-tailed hare, nearly the size of the northern hare; more slender in form, tail much longer; color blackish-brown above, white beneath.

The whole of the upper surface of this species is a mixture of black and pale brown, extending along the exterior of the thighs and legs, but becoming grayer on the cheeks; around the eyes grayish-white; upper surface of the tail blackish-brown; sides and under surface white; space behind the ears, on the back to the shoulder, reddish-brown. Under part of the neck and breast nearly similar to that of the back, but grayer, and having less black. Hairs, for half their length from the roots, silver-gray, blending into a pale yellowish-brown, then black, then pale yellowish-brown, and tip with deep blackish-brown. The whole of the abdomen, interior of legs, thighs, under surface of tail, snow-white; chin and throat grayish-white; soles pale rufous-brown; hind part of the outer surface of the ears, for two-thirds of their breadth, rufous-brown, thinly scattered with hair, black at the tips, edged with white at the sides; anterior third the color of

the head, but a little grayer. Interior of the ears very thinly clothed with hair, nearly naked, of a soiled white color, becoming grizzled-brown on the outer edge—inner edge dingy yellow; whiskers black, some of the hairs whitish; claws dark brown.

Dimensions.

Length from point of nose to				
root of tail, - - -	19 inches	0	lines.	
From nose to ear, about	4	"	4½	"
From heel to longest claw,	4	"	6	"
Waist to elbow,	4	"	2	"
Fore paws,	2	"	0	"
Tail, (vertebræ,)	4	"	1½	"
" to end of fur,	5	"	3	"
Length of ears posteriorly,	5	"	3	"
Across the eyes,	1	"	6	"

The specimen from which I have made the above description, is the original one from which Mr. Gray established the characters of this species. It was obtained by Douglass on his last visit to the south western coast of North America, and was sent to England after his melancholy death. The precise locality is not known, but is supposed to be on the north western part of Texas.

9. *LEPUS nigricaudatus*, (Bennet,) Red-footed Hare.

LEPUS nigricaudatus, (Bennet.) Proceedings of the Zoological Society of London, 1833, p. 41. Marked in the Catalogue of the Zoological Society, 582.

Color.—The whole of the upper surface fawn co-

lor, tipt with black. Hairs on the back silvery-gray for one-third of their length, then pale fawn, then black, then fawn and tipt with black. Back of the neck brownish-black, slightly tipped with fawn. A number of hairs, of unusual length (2½ inches) and delicacy, interspersed along the sides; in greatest abundance along the shoulders; these hairs are black from the base for two-thirds of their length, the remainder pale fawn. Sides, and under parts of the neck, dingy pale fawn, gradually becoming white on the chest. Haunches, legs, and under surface, white; the white hairs on the rump annulated with black, and near the root of the tail, almost entirely black. The hairs on the under surface of the feet red. Ears, posteriorly, for two-thirds, black at the roots, gradually blending into fawn, and on the interior third mixed with black hairs, edged at the tip with black, the remainder of the edge fawn; the outer margin of the posterior surface to its apex, pure white. Inner surface of the ears nearly naked, except at the outer edge, where they are clothed with short, grizzled-brown hairs. Whiskers white and black, the former predominating. Chin and throat white. The marginal line of demarkation, between the color of the back and that of the under surface, is somewhat abrupt across the upper portion of the thighs, and very distinctly marked, so as to give the animal the appearance of a commencement of a change of color from fawn to white.

This is another of the discoveries of Mr. Douglass, and the specimen is believed to have been ob-

tained on the mountains between the unsettled line of Texas and Mexico.

Dimensions.

Length from point of nose to root of tail, - - -	20 inches 0 lines.
Tail, (vertebræ,) 1	" 6 "
Tail, including fur, 2	" 6 "
From heel to longest nail, 4	" 7 "
Head over the curve, about 4	" 6 "
From eye to nose, 1	" 9 "
Across the eyes, 1	" 4 "
Ears, posteriorly, 4	" 7 "
Greatest breadth, 2	" 3 "

10. *LEPUS californicus*, (Gray,) Californian Hare.

LEPUS californicus, Gray, in Loudon's Magazine of Natural History, Vol. I., New Series, p. 586, Nov. 1837.

The Californian hare, nearly the size of the polar hare; in form and proportions resembling the English hare, (*LEPUS timidus*.) Upper surface dark brown; white beneath, tinged with yellow.

Color.—The top of the head and upper surface of the back mottled with black and pale yellowish-brown. The hairs on the back are annulated, as follows: pale plumbeous for two-thirds of their length, then very pale brown, then black, then yellowish-brown, and tipped with black; cheeks, breast, sides of the body, thighs, exterior of fore and hind legs, fawn, very slightly tipped, more or less, with black. Upper surface of the tail, and for a few

vertebræ of the back, black; under surface yellowish-brown; around the eye white; whiskers shorter than the head, brown, with one or two white ones. An indistinct line, of the color of the head, running from the crown of the head over the neck to the shoulders, uniting the color of the head with that of the body; roots of the ears running to a point triangularly downward, dingy yellowish-white, growing lighter as it ascends the exterior portion of the hind part of the ear, until it loses itself about half way in the black color which terminates the upper half of the outside of the ear; the other half of the ear a grizzled reddish-brown, becoming darker as it ascends; the hairs being annulated, are a mixture of reddish-brown, black, and pale yellow; the interior edge of the ear is pale yellow; each hair tipped with black. The inner surface of one-half of the ear, interiorly, nearly naked, the outer thinly clothed with hair, gradually thickening to the outer edge, where it becomes grizzled-brown. Exterior edge of the ear, for two-thirds, white, the remainder a beautiful, soft, velvety-black. Soles of the feet dingy brown. The whole of the under surface, from between the fore legs to near the root of the tail, white, more or less tinged with yellow; this color extends to the interior of the legs and thighs.

Dimensions.

Length from point of nose to root of tail,	22 inches 0 lines.
Head over the forehead, about	5 " 6 "
From eye to point of nose,	2 " 1½ "

Height of ear, posteriorly,	5	inches	10	lines.
From heel to point of middle claw,	4	"	8	"
Tail, including hair, about	3	"	3	"

The above description is taken from the original specimen, deposited in the museum of the Zoological Society of London. It was obtained by Douglass, in California, and was sent to England after his death. It bears a strong resemblance to the one mentioned by Mr. Poinsett, as existing in Mexico, to which I referred at the close of my last paper on the hares.

11. *LEPUS Richardsonii*. Richardson's Hare.

In the valuable, and daily increasing collection of the Zoological Society of London, I discovered two specimens of an undescribed species of hare, which the Society kindly permitted me to describe. It was sent over in the last collection of Douglass, which was made at California. I have named it after a naturalist, who, in addition to what he has already done for natural history, is still untiringly engaged in elucidating the unexplored treasures of the American continent.

This species is a little larger in size than the common American gray rabbit, (*L. sylvaticus*.) Its legs and ears, however, are much longer and thinner, and its tail shorter. Whole upper surface of a light mottled-gray color; beneath white.

Color.—Head, cheeks, and whole upper surface have a mixture of yellowish-white, black, and very pale buff color, giving it a mottled-gray appearance.

Behind the ears, instead of the buff color found in most of the species, it is of a soiled, brownish-gray, extending around the neck and to the breast, continuing down the point and sides of the fore legs; the same color is found on the exterior of the thighs, and extending along the posterior portion of the hind leg. Under surface of the feet pale dark brown. Tail black above, pale brownish-yellow beneath. The hinder parts of the ear thinly covered with hair, white for two thirds of its breadth, with black for one and a half inches from its tip; the remaining third, for its whole length, grizzled black and pale yellow, edged with white to within an inch of the tip of the ear. Interior of the ear very thinly scattered with white hairs, gradually becoming black near the exterior edge. Chin and throat white, pale plumbeous at the roots. The whole of the under surface, from between the fore legs throughout the abdomen, white, tinged with pale yellow towards the sides. Whiskers black for half their length; the remainder white.

The above specimen was marked in the collection A, 586.

Another specimen, in the same collection, (marked A, a, 586,) bears a general resemblance to the above, and appears to be in winter fur, whilst the former is in its summer dress. The dimensions in both specimens were precisely the same.

In this specimen the whole upper surface is a mixture of black and pale brown, the former color predominating. On the back of the neck dingy pale brown, blending on the throat and breast into

yellowish-brown. The fore legs are of the same color, with a little black interspersed. The color on the back extends down the exterior part of the thighs, where it becomes a little browner. Soles of the feet the same as in the other specimen. Chin and throat dingy white. The whole under surface dingy white. Ears differing from the other specimen, in being yellowish-white in those places where they are white in the other, and browner where the grizzled color exists. Whiskers, in nearly all the hairs, black to the tips, with one or two white hairs intermixed.

Dimensions.

Length from nose to root of tail,	18	inches	0	lines.
“ of head,	4	“	6	“
Tail, including fur, about	1	“	3	“
Length of ears, posteriorly,	5	“	9	“
Heel to end of middle claw,	4	“	7½	“
Breadth of skull over the eyes,	1	“	6	“
Eye to point of nose,	2	“	1½	“
Breadth of ear,	2	“	5	“
Length of elbow to wrist,	4	“	1½	“
From toe to wrist,	2	“	3	“

Nothing is known of the habits of these species, as the specimens sent by Douglass was not accompanied by any notes.

12. *LEPUS Townsendii*. Townsend's Hare. Pl. II.

This species, which is another of the discoveries of Mr. Townsend, and of which no specimen exists

in any museum that I have had an opportunity of examining, is one of the most singular hares that has ever fallen under my notice. If the form is indicative of character, this animal, from its slender body, long hind legs, and great length of tarsus, must be one of the swiftest among the hares. Should the species referred to by Lewis and Clarke, which could clear twenty-one feet at a bound, be the *LEPUS campestris* of a former article, it will, to all appearances, find no contemptible opponent in a trial of speed with its next door neighbor, the present species.

Characters.—Size of the northern hare, (*L. americanus*.) Ears, tail, legs, and tarsus, very long. Color above light gray ; beneath white.

Color.—Crown of the head, cheeks, neck, and whole upper parts, the front of the ears and legs, externally, gray, with a feint cream-colored wash. Hairs whitish, or silver-gray at base ; then brownish white, then black, with a faint cream tinge, and ultimately tipped with black, interspersed with long silky hairs, some of which being wholly black. Chin, throat, whole under surface, interior of legs, the whole of the tail, (with the exception of a narrow dark line on the top,) pure white to the roots. Irides light hazel, around the eyes white. The tips of the back parts of the ears black ; the external two-thirds of the hinder part of the ears white, running down the back part of the neck, and there mingling with the color of the upper surface ; the interior third of the outer portion of the ear the same gray color as the back, fringed on the edge

with long hairs, which are reddish-fawn at the roots and white at the tips. The interior of the ear is very thinly scattered with beautiful fine white hairs, being more thickly clothed towards the edge where it is grizzled-black and yellowish, but the edge itself is fringed with pure white, becoming yellowish towards the tip, and at the tip is black. Whiskers nearly as long as the head, for the most part white, black at the roots, a few hairs are pure white, others wholly black.

The specimen from which the above description and drawing were taken, was a female, procured by Mr. Townsend on the Walla-walla, one of the sources of the Columbia river. The following note, by the discoverer of this hare, reached me at Edinburgh, after the above description was made. It will afford valuable information in regard to its habits.

“The specimen is that of a female—and the species is common on the Rocky Mountains. I made particular inquiries, both of the Indians and British traders, as to the changes it undergoes at different seasons, and they all agreed that it never was lighter colored. We first saw it on the plains of the Black-foot River, west of the mountains, and observed it in all similar situations during our route to the Columbia. When first seen, which was in July, it was lean and unsavory, having, like our common species, the larva of an insect imbedded in its neck; but when we arrived at Walla-walla, in September, we found the Indians, and the persons attached to the fort, using them as a com-

mon article of food. Immediately after we arrived, we were regaled with a dish of hares, and I thought I had never eaten any thing more delicious. They are found here in great numbers on the plains covered with wormwood, (*Artemesia*.) It is so exceedingly fleet that no ordinary dog can catch it. I have frequently surprised it in its form, and shot it as it leapt away, but I found it necessary to be very expeditious, and to pull trigger at a particular instant, or the game was off among the wormwood, and I never saw it again. The Indians kill them with arrows, by approaching them stealthily, as they lie concealed under the bushes, and in winter take them with nets. To do this, some one or two hundred Indians, men, women, and children, collect, and enclose a large space with a slight net, about five feet wide, made of hemp; the net is kept in a vertical position by pointed sticks attached to it, and driven into the ground. These sticks are placed about five or six feet apart, and at each one an Indian is stationed, with a short club in his hand. After these arrangements are completed, a large number of Indians enter the circle, and beat the bushes in every direction. The frightened hares dart off towards the net, and, in attempting to pass, are knocked on the head and secured. Mr. Pambrun, the superintendent of Fort Walla-walla, from whom I obtained this account, says that he has often participated in this sport with the Indians, and has known several hundred to be thus taken in a day. When captured alive, it does not scream like the common gray rabbit, (*LEPUS sylvaticus*.)

This hare inhabits the plains exclusively, and seems particularly fond of the vicinity of the aromatic wormwood.* Immediately as you leave these bushes, in journeying towards the sea, you lose sight of this hare. The specimen I have sent is not the largest I have seen, some individuals measuring several inches more in length."

Dimensions.

From nose to insertion of tail,	21 inches 0 lines.
Tail to end of hair,	5 " 6 "
" (vertebræ,) about,	3 " 3 "
Ears, measured posteriorly,	4 " 9 "
Length of head, (measured over the forehead,)	4 " 6 "
From eye to nose,	2 " 0 "
Heel to longest nail,	5 " 6 "

13. *LEPUS artemesia.* Wormwood Hare.

Characters.—Small; of a gray color, with pale rusty color on the back of the neck and legs. Tail, above, the color of the body; beneath, white. Under parts of the neck, and lower surface of the body, white—all the fur being gray at the base. Ears as long as the head; tarsus well clothed.

Description.—The head is much arched; upper incisors deeply grooved. The color of this species is grizzled-black, and brownish-white above. The fur is soft, pale gray at the base, shaded into

* The specimen was stuffed with this article.

brownish externally, annulated with brownish-white near the apex, and black at the tips. Under parts, and inner sides of limbs, white, the hairs pale gray at the base. Neck, with the hairs on the sides and under parts, gray, tipped with brownish-white, having a faint yellow hue. Chin and throat grayish-white, the hairs being gray at their base and white at their tips. The whole back of the neck and limbs, exteriorly, of a pale rusty-fawn color; those on the neck uniform to the base. Feet, beneath, a very pale, soiled, yellow-brown. Tail colored above as the back, with an admixture of grayish-black hairs; beneath white. Ears, externally, on the anterior part, colored as the crown of the head, posteriorly ashy-white; at the apex margined with black: internally, nearly naked, excepting on the posterior part, where they are grizzled with grayish-black and white; in the apical portion they are chiefly white.

Dimensions.

Length from nose to root of tail,	12 inches	0 lines.
From heel to point of longest nail,	3 " 2 "	
Height of ears, externally,	2 " 8 "	
From ear to point of nose,	2 " 7 "	
Tail, (vertebræ,) about	1 " 1 "	
" to end of fur,	1 " 9 "	

Mr. Townsend, who procured this species, remarks: "This small hare inhabits the wormwood plains near the banks of the streams in the neighborhood of Fort Walla-walla. I cannot define its range with any degree of certainty, but I have reason to

believe that it is very contracted, never having met with it many miles from this locality. It is here abundant, but very shy and retired, keeping constantly in the densest wormwood bushes, and leaping with singular speed from one to another when pursued. I have never seen it dart away and run to a great distance like other hares. I found it very difficult to shoot this animal, for the reasons stated. I had been residing at Fort Walla-walla for two weeks, and had procured only two, when, at the suggestion of Mr. Pambrun, I collected a party of a dozen Indians, armed with bows and arrows, and sallied forth. We hunted through the wormwood within about a mile of the fort, and in a few hours returned, bringing eleven hares. The keen eyes of the Indians discovered the little creatures squatting under the bushes, where, to a white man, they would have been totally invisible. This hare, when wounded and taken, screams like our common species.

14. LEPUS *Bachmani*, (Waterhouse.) Bachman's Hare.

LEPUS *Bachmani*. Manuscript of G. R. Waterhouse. Manuscript edition to Zoological Society, Catalogue A, 587. Read before the Zoological Society of London, August 14th, 1838.

In examining the collection of American Mammalia, in the museum of the Zoological Society of London, aided by my friend, Mr. Waterhouse, the curator of the Museum, to whom I am indebted for many facilities in examining specimens, and for

many acts of personal kindness,—we discovered a small species of undescribed hare, sent from the western coast of America, by Douglass. He described it under the above name before the Zoological Society, and has politely offered me the use of his manuscript, from which, in order to render the synopsis of our American species of this genus as complete as possible, I have copied his description.

“ *General Characters.*—In form, this species bears a general resemblance to *LEPUS palustris*, but is only one-third of its size. Color less yellow; ears longer in proportion; feet densely clothed with hair, so as to cover the nails. Lower surface of the tail white; upper surface gray-black—most of the hairs being annulated near the tip with whitish. Upper incisors much arched and deeply grooved.

“Fur very long and soft, of a deep gray color, annulated near the apex with brownish-white, black at the points; on the belly gray at the base; chest and fore part of the neck, with the hairs, colored as those of the sides of the body; viz., the visible portion is brownish-white, each hair being dusky at the tip. Chin and throat gray-white. The hairs on the head colored like those of the body. An indistinct, palish, longitudinal dash on the flanks, just above the haunches; roots of the tail, beneath, white. The general color of the tarsus, above, is white; the hairs, however, are grayish-white at the base, then annulated with very pale buff color, almost white, and pure white at the points. The sides of the tarsus brown. The long hairs which cover the under part of the tarsus, as well as that

of the fore feet, deep brown. The fore feet, above, very pale brown, approaching to white. The hairs covering the toes, principally white. Claws slender and pointed, that of the longest toe remarkably slender. Ears longer than the head, sparingly furnished with hair, the hairs minute and closely adpressed, externally, on the fore part grizzled with black and yellowish-white, on the hinder part grayish-white; internally, the ears are white, towards the posterior margin obscurely grizzled with blackish, at the margin yellowish, and the apical portion is obscurely margined with black; at the base, the hairs are of a woolly nature, and of a very pale buff color; the hairs on the occipital part of the head, and extending slightly on the neck, are of the same color, and of the same woolly character."

This animal possibly may not be an adult, but neither in the teeth, as far as the stuffed specimen will allow of the examination, nor in the character of the fur, can I see any reason for believing it to be young, excepting that it is much under the ordinary size of the species of the genus *LEPUS*; and although it may possibly not be an adult, it certainly is not a very young animal. Compared with *LEPUS palustris*, with which species it was sent over by Mr. Douglass, it presents the following points of distinction:—Although the animal is not above one-third of the size of *LEPUS palustris*, its ears measure about one-fourth of an inch more in length. In fact, in the present animal, they are longer than the head, whereas, in *LEPUS palustris*, they are much shorter. The next most important difference

is in the feet, which, instead of having comparatively short and adpressed hairs, which, consequently, do not conceal the claws; they are, in this species, long and woolly, especially on the under parts, concealing the claws, and extending upwards of a quarter of an inch beyond their tips. The claws are more slender and pointed, especially the fore feet. Beside these essential differences, there are some others which, perhaps, may be considered of minor importance. The fur is much softer and more dense; the longer hairs are extremely delicate, while in *L. palustris* they are comparatively harsh. The *LEPUS palustris* is in color distinctly washed with yellow, whereas the pale annulations of the hair, which give the yellow hue to that species, are in the present animal almost white; there is, however, an obscure brownish cast, and towards the haunches, a very indistinct, yellowish tint.

This specimen was procured in the south-western portions of North America, supposed to be between California and Texas.

Dimensions.

Length from point of nose to root of tail,	10	inches	0	lines.
Tail to end of fur, about	1	"	3	"
Ear, internally,	2	"	8	"
From heel to point of longest nail,	3	"	0	"
From nose to ear,	2	"	5½	"

General Remarks.

Although I have published these species without any regard to arrangement, and for the most part

in the order in which they were found, yet they may be easily arranged under several very natural groups. The species existing in high northern latitudes, and becoming white in winter,—such as *LEPUS glacialis*, *campestris*, and *americanus*,—will form the first group, to which *L. variabilis*, existing in the north of Scotland, although a very distinct species, is closely allied. Next may be placed the species with long ears and tails, such as *L. Townsendii*, *longicaudatus*, *nigricaudatus*, *Richardsonii*, and *californica*, all of which are confined to the western coast of North America. *LEPUS aquaticus* and *palustris*, with the tarsi thinly clothed with hair, the nails extending beyond the fur, adapting them to their aquatic habits, will form another group, to which, in size, color, and shortness of tarsus, *L. sylvaticus* is allied, although it differs from the others in having its feet thickly clothed with fur. The *L. artemesia*, *Bachmani*, and *Nuttallii*, being comparatively diminutive in size, with short ears, head, and tail, will form the last, and very natural group.

The species which have been given in this article, have not been published hastily, and without mature reflection, or a rigid test of examination. I would also add, that they were all, with the exception of *L. Nuttallii*, which is sufficiently distinct, compared and examined at the Museum of the Zoological Society in London, by some of the most eminent naturalists of Europe, who unhesitatingly acknowledged them as true species, and marked them as such in their catalogues and on their specimens. Although the

industry and zeal of our travellers and naturalists, Drummond, Douglass, and Townsend, (the two former having perished in their ardor to advance the cause of natural science,) have greatly added to our list of the species of this genus, yet much remains to be done, and a wide field is still open for farther discoveries. The far west seems to be a region where the genera LEPUS, ARCTOMYS, and SPERMOPHILUS, principally abound, and rich stores, in every department of Natural History, lie in wait, to reward the zeal and enterprise of future naturalists.

The following Species must be added to the List of Mr. Townsend's Quadrupeds.

PTEROMYS *oregonensis*. Oregon Flying Squirrel.

Characters.—Intermediate in size between P. *volucella*, and the northern PTEROMYS *sabrinus*. Ears longer than in the latter species; fur more compact; the lobe of the flying membrane joining the fore foot, much longer in proportion, making that membrane broader; foot larger; general color above brown, beneath yellowish-white.

Description.—All the fur of this species is deep gray at the base, that of the back tipped with yellowish-brown; tail pale brown above, dusky towards the extremity; beneath brownish-white. Whiskers numerous, and very long, chiefly of a black color, and grayish at the tips. Hairs covering the flying

membrane chiefly black, most of them slightly tipped with pale brown; feet dusky; around the eyes blackish; ears with minute, adpressed, brown hairs externally, and brownish-white internally.

This species differs from *P. sabrinus* in several very striking particulars; although a smaller animal, the arm of the wrist which supports the flying membrane, is $11\frac{1}{2}$ lines in length, whilst that of the former is only 9: thus the smallest animal has the largest flying membrane.

The fur of *P. sabrinus* is much the longest. The fur on the belly of the latter is white, whilst that of *oregonensis* has an ochreous tinge. The hairs on the tail of *P. sabrinus* is only slightly tinged with lead color at the roots, whilst in *oregonensis* it extends to half the length of the hairs. The greater length, and less breadth, however, of the ear of the latter, is a sufficient mark of distinction.

From our little *PTEROMYS volucella*, the difference is so great that it is unnecessary to institute a particular comparison. Besides being much larger than our little species, and not possessing the beautiful downy white on the belly, the two species may be instantly detected, in the *volucella* having its hairs white to the roots, which is not the case in the other species.

Dimensions.

Length from point of nose to root of tail,	6 inches 8 lines.
Tail to point of fur,	6 " 0 "
Height of ear, posteriorly,	0 " 7 "

Breadth between the outer edges

of the flying membrane,	8 inches 0 lines.
Longest hind toe, including nail,	0 " 5½ "
Longest fore toe, including nail,	0 " 5½ "
From heel to point of nail,	1 " 6½ "
Nose to ear,	1 " 6 "

Habits.—Mr. Townsend remarks, in regard to this species, that it inhabits the pine woods of the Columbia, near the sea; very rare. Habits of the *P. volucella*.

GEOMYS *borealis*, (Richardson.)

PSEUDOSTOMA borealis. Manuscript notes of Dr. Richardson.

Among the specimens brought by Mr. Townsend, were two differing considerably in size, which I find identical with one which had been procured on the Columbia river by Douglass, and which was in the possession of Dr. Richardson. As he is preparing a monograph of this perplexing genus, I should not have noticed the present and following species in this paper, were it not for the necessity I am under, of indicating the species of quadrupeds brought to the United States by Mr. Townsend. I have, therefore, adopted the names of Richardson, who will give more ample descriptions, and is fully entitled to the credit of having been the first to detect the species.

General color pale gray, the upper parts more or less washed with yellow. Insides of pouches, the

whole of the under parts, the feet and tail, white. Hair of the upper and under parts of the body, dark slate-gray at base. Ear distinct, not hidden by the fur, consisting of a small round opening, surrounded by an elevated ridge, the highest portion of which is behind, and about one line in height. Claws white, those of fore feet very long. Incisors yellow in front, those of the upper and lower jaw of the same color; with a lens, a faint groove is seen in the upper incisors, situated close to the inner margin. Tip of muzzle naked; feet bare beneath; behind the ears dusky.

Dimensions.

From nose to root of tail,	7 inches 6 lines.
Tail,	2 " 0 "
Tarsus and claws,	1 " 1½ "
Central claw of fore foot,	0 " 5 "
From nose to ear,	1 " 6½ "

Hind foot.—The central toe is the longest; outer toes equal and short. A long brush of stiff white hairs on the inner side of the two innermost toes of the fore feet; inner toe rather short; outer toe the next in length; middle toe longest; the one on each side about equal.

In the young specimen, the back had a deep yellow wash. Length of body 5 inches 6 lines; of tail 2 inches.

Mr. Townsend's specimens were procured on the Columbia river.

GEOMYS Townsendii, (Richardson's Manuscripts.)

General color very pale gray above, with a faint yellowish wash; muzzle dusky gray, under parts grayish-white; chin pure white; tail and feet white, the former grayish above, hairs of the back very pale gray at the base, pale yellow at the apex; the extreme tip cinereous. Teeth yellowish-white. Upper incisors with a faint groove near the internal margin. Claws and fore feet moderate white.

Dimensions.

From nose to tail,	7 inches 6 lines.
Tail,	2 " 9 "
Tarsus,	1 " 3 1 "
Central claw of fore foot,	0 " 5 "
Nose to ear,	1 " 5 "

The specimen was procured by Mr. Townsend on the Columbia river.

I am obliged to confess that I should not have ventured to publish this species as distinct from the preceding, on my own responsibility. The discriminating eye of Dr. Richardson, however, who has studied this genus more carefully than I have had an opportunity of doing, may have detected marks of difference which I have not been able to discover. As the species, however, will be given under the above name, I have found it necessary to indicate it here.

Catalogue of the Crustacea brought by Thomas Nuttall and J. K. Townsend, from the West Coast of North America and the Sandwich Islands, with Descriptions of such Species as are apparently new, among which are included several species of different localities, previously existing in the collection of the Academy. By J. W. RANDALL.

Read June 18th, 1839.

CRUSTACEA BRACHYURA.

Fam. *Maiadæ*.

Genus LIBINIA, (Leach.)

LIBINIA—(variety of *L. canaliculata*? Say.) Mus. Acad.

The hitherto described species of the genus LIBINIA, as restricted by M. Milne Edwards, have so great a mutual resemblance, that we hesitate to consider the present one as new, until more specimens have been obtained for comparison.

Its principal peculiarities may be thus stated.

L. Testa multispinosa, manibus politis, vix granulatis.

Rostrum elongate, somewhat flattened above, and channeled at base. Anterior feet polished, and not perceptibly granulated. Shell pyriform, only slightly convex, and studded with a great number of sharp spines, interspersed with tubercles. The lateral spines are six or seven on each side, the dorsal row about eight, intermediate ones about a dozen on each side, more or less elongated. The tubercles are about as numerous as the spines, and scattered irregularly between them. Second pair

of feet scarcely one and one-fourth times the length of the carapax.

Length of shell, in the present specimen, (rostrum inclusive,) scarcely $1\frac{4}{16}$ inches, but, probably attains a greater size.

A single specimen, brought by Mr. Nuttall from Upper California.

Compared with such specimens as I have seen of the *L. canaliculata*, the shell here is less convex, the rostrum more flattened above, the anterior feet more smooth, and the spines and tubercles more numerous.

It may be named, provisionally, *L. affinis*, allied to *L. emarginata*, Leach, and to *L. dubia*, Edwards, which last is described as being less spinous than the *L. canaliculata*.

Genus HERBSTIA, (Edwards.)

H. parvifrons. Mus. Acad.

Corpore depresso, in latere spinoso, pedibus spinosis, levitèr dilatatis, manibus lævigatis, dactylis apice serrulatis.

Body flattened above, punctured, somewhat hairy; sides spinous, especially anteriorly; rostrum very short; feet spinous above; hands of the anterior pair with only a few very small spines at their base; pincers without teeth, except towards their apices, where, for at least one-third of their whole length, they are hollowed out on their prehensile side, and serrated laterally, so that, when closed, they become interlocked at their extremities by means of the serratures.

One specimen, brought by Mr. Nuttall from western America.

Length of carapax, scarcely one inch.

Genus CHORINUS, (Leach.)

The following species of CHORINUS is preserved in the Museum of the Academy without any indication of its name or locality; as it disagrees in its details with the only four species of the genus which I have seen noticed, viz., the *C. aries*, (Latr.) the *C. heros*, (Herbst.) and the *C. aculeata*, and *C. Dumerilii*, (Edwards,) I have ventured to describe it as new.

CHORINUS *armatus*. Mus. Acad.

Pedum pare antico spinoso; manibus tuberculosis; spinis frontis divaricantibus, testa lanuginosa, utrinquè 4-spinosa, posticè 2-spinosa.

Body elongate pyriform; frontal spines extremely long, divergent; supra-orbital spine very strong; post-orbital spine dilated at base, and moderately produced. Shell depressed in the middle, but anteriorly convex, on each side moderately convex; an obtusely rounded elevation behind the middle; apex somewhat produced, crowned with a short spine, having another behind it; sides, each with four great spines, exclusive of the post-orbital one. Feet downy; anterior pair about $2\frac{1}{2}$ times the length of the carapax; arm spinous; hand and wrist studded with granules; posterior feet smooth, second pair nearly $1\frac{1}{2}$ times the length of the third.

Length of carapax behind the base of the frontal horns nearly 3½ inches.

Genus *EPIALTUS*, (Edwards.)

E. Nuttallii. Mus. Acad. Pl. III.

Testa polita, atropurpurea, maculis testaceis posticè sub-ocellatis ornata; margine obtusè tridentata; rostro depresso, apice profundè emarginato: corpore infrà sanguineo, ocellis testaceis ornato.

Shell smooth, dark purplish, besprinkled with testaceous spots becoming large and somewhat ocellate behind, and still larger and brighter on the under side of the body; rostrum broad at base, flattened above; apex profoundly notched; carapax moderately elevated, having three obtuse, distant teeth on either margin, including the post-orbital one; hands in the male very large.

Length of carapax in the male about four inches, inclusive of the rostrum; greatest breadth, a little over three inches.

A single pair, brought by Mr. Nuttall from Upper California; the female, but an indifferent specimen, is represented on the accompanying plate,* because the great size of the male does not admit of its being figured without reduction. The male differs from the female, not only in being twice as large, but in its colors, which are brighter, and in its spots, which are larger.

* On the plate the name *LIBINIA Nuttallii* has been appended, a mistake which could not be corrected after the impression had been struck off.

E. productus. Mus. Acad.

Testa elongata, subquadrata, indistinctè maculata; margine utrinquè pone oculos tridentata; rostro profunde bifido, utrinquè unidentato.

Carapax elongate, subquadrate, fuscous, with some obscure spots; rostrum dilated at base, flattened above and divided by a broad notch; on each side, the base is produced into a great tooth, directed anteriorly; marginal teeth of the carapax, three on each side, including the small post-orbital one. The middle tooth is so great that its base occupies nearly the whole anterior side of the carapax, and is so straight on its outer edge that it forms almost a right angle with the anterior margin; posterior tooth stout, growing from the middle of the margin.

Length of carapax, inclusive of the rostrum, about 1½ inches.

A single female, brought by Mr. Nuttall from Upper California. The specimen not being alive when discovered, had, perhaps, undergone some alteration in color.

This species has a great resemblance to the *EPIALTUS marginatus*, (young,) figured by Mr. Bell in the Transactions of the Zoological Society of London, but may be particularly distinguished by the position of the anterior lateral tooth of the carapax, which, in that species, is not placed immediately behind the eye, but in the middle of the curve of the anterior margin; moreover the anterior angles are not so much expanded as in the present species.

Fam. *Parthenopiadæ*.

Genus PARTHENOPE, (Fabr.)

P. horrida, (Linn.) Mus. Acad.

Brought from the Sandwich Islands by J. K. Townsend.

Fam. *Cancridæ*.

Genus PLATYPODIA, (Bell.) (CANCER, Latr. and Edwards.)

P. granulosa, (CANCER *granulosus*, Ruppell,) different from the *P. granulatus*, (CANCER *granulatus*, Audouin.)

Several specimens, brought from the Sandwich Islands, by Mr. Nuttall and J. K. Townsend. The four posterior pairs of feet are not quite smooth, but somewhat granulated in each specimen; in other respects it agrees with the description of the *CANCER granulatus*.

Genus LAGOSTOMA, (Edwards.)

L. nodosa. Mus. Acad.

Testa transversa, subconvexa, nodosa, posticè sub-depressa, lateribus, 5-dentatis; fronte obtusa, vix 4-lobata; pedibus anticis, reticulatis, in maribus crassis, tarsis tuberculosus.

Shell more than one-half broader than long, but little convex, and somewhat depressed behind; anteriorly, and antero-laterally, divided by deep

grooves into great tubercles, the posterior ones being flattened above; front very obtuse, sinuous, properly speaking, two-lobed, the lobes being a little produced toward the outer angle; median fissure tolerably well marked; orbits surrounded with tubercles, having about three above and two beneath; margin with about five great obtuse teeth on each side, of which the posterior pair is smallest; most of these teeth are dilated on each side at base, forming small tubercles, very distinct when viewed from beneath; anterior feet very stout in the male; hand and wrist somewhat reticulate with irregular elevated lines; four posterior pairs of feet a little rough on their superior edge, the roughness increasing in the direction of the tarsi, which are studded with small tubercles; the third joint of the outer maxillary feet, has an anterior inner notch, less large than the anterior one.

A single male specimen, brought by Mr. Nuttall from the Sandwich Islands; its length is $1\frac{1}{8}$ inch, breadth fully $1\frac{1}{8}$ inches.

A small species, nearly allied to the present, and, perhaps, a young specimen of it, has been brought by Dr. Morton from the West Indies; no spines exist on the feet of either.

This species has a striking resemblance to the *CANCER inequalis*? of Olivier, as figured by Savigni in the great work on Egypt, but Olivier says that the hands of the anterior feet in his species are smooth. The *C. inequalis* is probably another species of the same genus.

Genus XANTHO, (Leach.)

The following species of XANTHO seems to have a close analogy to several others already described, without well agreeing with any of them; indeed, the descriptions heretofore given by authors of several species of this genus, are too brief, when considered as applying to a group so extensive, so widely diffused, and composed of individuals nearly related to one another.

X. intonsus. Mus. Acad.

Testa polita, nodosa, levitèr convexa, margine utrinquè 4-dentata: fronte producta, inequaliter 4-lobata; pedibus compressis, valdè ciliatis; manibus suprà cristatis, externè carinatis.

Shell polished, not greatly convex, anteriorly and antero-laterally divided by broad, shallow, somewhat interrupted grooves, into several great, but little elevated lobes, thinly besprinkled with large, unequal punctures, very visible through a microscope; antero-lateral margin with four teeth on each side, the two anterior of which are merely rounded crests; in each depression between the teeth, a small fissure is visible, dividing their bases from one another; postero-lateral margin somewhat depressed; front four-lobed, the two middle lobes approximate, rounded at tip, and considerably produced, the outer ones small, but very distinct; anterior feet stout, with a few punctures scattered over the surface; hands with a great crest above,

and three or four obtuse, but well defined longitudinal elevations on the outer side; intermediate spaces reticulated with small elevated lines, presenting to the eye a kind of cellular texture; anterior inner tooth of the carpus well defined; pincers canaliculate, brown, inclining to black; four posterior pairs of feet flattened on the sides, having the upper edge sharp, but gradually dilating in the direction of the tarsus, and covered above and underneath, throughout their whole length, with long, dense, light brown hair, which, on the upper side of the two last joints of most of the feet, as well as on the tarsi, is disposed in longitudinal rows.

A single female specimen brought by Mr. Nuttall from the Sandwich Islands. Its length is about $1\frac{8}{10}$ inches; greatest breadth fully two inches.

It is probably very nearly related to the *X. incisus*, (Edw.) but that species is described as having on the outer face of the hands, several ranges of tubercles, and many small transverse crests on the carapax over the hepatic and stomachal regions.

The *X. Rumphii*, (Guerin,) (*X. octodentatus*, Edw.) seems also to be nearly allied to it, but there the front is but little advanced, and divided into only two lobes; the anterior angles of the carapax seems also to form a curved line with the front, whereas, here they are produced almost to a level with its outer lobes.

The *X. acasta*, (*CANCER acasta*, Herbst.) is probably another very nearly allied species, but its carapax, according to M. Edwards, appears to be smooth.

The present species may be referred to that section of the genus in which M. Edwards places those species which have a crest on the upper side of the hands, as well as on the four posterior pairs of feet.

Genus ETISUS, (Edwards.)

E. laevimanus. Mus. Acad.

Testa transversa, polita, nodosa, margine obtusè 4-dentata; fronte producta, vix sinuata; manibus lævigatis, tarsis tuberculosus.

Carapax one-half broader than long, not very convex, anteriorly and antero-laterally divided by several grooves into large but little elevated tubercles; margin with four large obtuse teeth; front produced, almost imperceptibly sinuous; hands smooth; pincers very large; posterior feet short, a little flattened, nearly smooth, except toward the last joint, which is somewhat rough, and the tarsi, which are studded with small tubercles. Color yellowish; length of carapax from $\frac{3}{16}$ of an inch to rather more than an inch.

Two male specimens, brought by Mr. Nuttall from the Sandwich Islands.

In form it is much like the LAGOSTOMA, described above, but the position of the antennæ sufficiently distinguish it. Moreover, the tubercles of the carapax are greatly depressed, and the body is less broad, and less depressed behind, in which respect it disagrees also with the *CANCER inequalis*? (Savigni, Egypt.)

Genus CANCER, (Leach, and Bell,) (PLATYCARCINUS,
Latr. and Edw.)

C. productus. Mus. Acad.

Testa depressa; fronte subquadrata, valdè producta, obtusè 5-lobata, lateribus 9 vel 10-lobatis.

Shell greatly flattened behind the front, and antero-laterally; front greatly produced beyond the orbits, terminating in five nearly equal and not very distinct lobes, the middle lobes not greatly produced beyond the lateral ones; antero-lateral margin of the carapax with nine or ten nearly equal, obtuse, lobe-like teeth, postero-lateral margin very concave; anterior feet tuberculous above; pincers very short.

One specimen, brought by Mr. Nuttall from West America.

Length hardly one inch, but probably attains a greater size.

C. irroratus, (Say.) Mus. Acad.

Two specimens, brought from West America by Mr. Nuttall; not essentially differing from those found on the coast of New England.

This species is so liable to vary with age, both in the thoracic markings and in the shape and direction of the marginal teeth, that without care one might easily mistake varieties for distinct species.

M. Edwards states that the frontal teeth in this genus form an uneven number, one always growing

from the middle, but here there are frequently only four equidistant frontal teeth.

Genus *TRAPEZIUM*, (Latr.)

T. cymodoce, (CANCER *cymodoce*, Herbst.) (*TRAPEZIUM dentifrons*, Latr.) Mus. Acad.

Several specimens, well agreeing with the figure of *T. cymodoce*, have been brought from the Sandwich Islands by Mr. Nuttall and J. K. Townsend.

Fam. *Portunidae*.

Genus *LUPA*, (Leach.)

L. sanguinolenta, (Herbst.)

Many specimens, brought by Mr. Nuttall and J. K. Townsend from the Sandwich Islands.

Genus *THALAMITA*, (Latr.)

T. pulchra.

Testa subhexagona, cœruleo-maculata, margine utrinque 7-dentata, dentibus secundo et quarto minimis; fronte 8-dentata.

Carapax somewhat hexagonal, disk with several transverse, distinctly elevated lines, formed of very minute granules; post frontal, and antero-lateral portion granulated, some rugosities on each side behind the middle, remainder of the surface nearly smooth; front with eight large, elongated, nearly equal, obtusely rounded teeth, those on one side a little diverging from the corresponding ones on the other, and all of them somewhat flattened above;

second tooth from the middle bifid beneath; margin with seven teeth on each side, of which the second and fourth are very small, the others large, sharp, and nearly equal; color bright vermillion, variegated with greenish-blue spots, some single, some in clusters, and varying much in shape and size, though very symmetrical, as regards the two sides of the carapax; anterior feet very stout and angular, the upper surface with many large granulations; hand about the length of the carapax, with five stout teeth on its upper side, and a basal tubercle; carpus with four teeth, that on the inner angle of great size; arm with four teeth, the terminal one greatly dilated at base and flattened; pincers profoundly canaliculate; four posterior pairs of feet somewhat flattened, and having their two last joints more or less profoundly channeled on each side, but the last pair with a double channel on the outer surface of its three last joints, the first of which has a strong spine near the extremity; the natatory plate is armed at tip with a small corneous tooth.

Length of carapax from 2 to more than 2½ inches.

Two specimens, brought from the Sandwich Islands by Nuttall and Townsend.

It seems to be allied to the *T. erythrodactyla*, (Lam.) and probably to the *CANCER seriatus*, (Linn.)

Genus *PODOPHTHALMUS*, (Lam.)

P. vigil, (Fabr.) Mus. Acad.

Brought in considerable numbers from the Sandwich Islands, by Nuttall and Townsend.

Fam. *Thelphusiadæ*.

Genus POTAMIA, (Latr.) (BOSCIA, Edwards.)

Of two closely allied species of this genus, preserved without labels in the collection of the Academy, the only very distinct character that can be made use of for determining, which is the *P. dentata* of Latreille, is this, viz., that the orbits are entire; one of the present species agreeing with the description in this respect, and not essentially differing from it in other points, as far as can at present be determined, I have supposed, therefore, to be the *P. dentata*.

P. dentata, (Latr.) Mus. Acad.

Testa depressa, utrinquè obliquè impressa; fronte angustata, bilobata, truncata.

Front between five and six-twentieths of the width of the carapax in its greatest diameter, not bifid, but divided by a superficial groove into two truncate lobes; on each side of this groove is a small transverse indentation; orbits without a notch at the outer angle; a very profound and oblique groove, extending from the antero-lateral margin of the carapax toward the median impression, in a direction to form with it an obtuse angle, but interrupted a little above the middle; hands unequal in the male, index curving downward; many extremely minute teeth border the lateral margin of the carapax, and the upper edge of the feet; under

side of the arm bordered by still larger teeth; a spine on the inner side of the carpus.

If the present species should prove distinct from the *P. dentata*, it may be named *P. angustifrons*, in contradistinction to the following, which we call

P. latifrons. Mus. Acad.

Testa depressa, transversè impressa, pone oculos incisa; fronte dilatata, margine multidentata.

Front between seven and eight-twentieths of the width of the carapax, truncate, and not divided into lobes by a superficial groove, as in the above species, its extremity somewhat folded beneath; orbits with a profound notch on the outer side; transverse impression of the carapax forming a gentle curve toward the middle instead of a nearly straight oblique line; median impressions subtriangular, large and profound; disk nearly smooth, or almost imperceptibly roughened, postero-lateral portion distinctly granulated; antero-lateral teeth somewhat unequal, and much larger than in the preceding species, those bordering the feet and arm nearly as in *P. dentata*; upper side of the arm and hand somewhat roughened.

Length of the only specimen in the collection (a female) hardly $1\frac{4}{10}$ inches.

It is supposed to have been brought from Surinam, or the West Indies.

Fam. *Gecarcinidæ*.

Genus ORTHOSTOMA.

Testa convexa, margine carinata, lateribus sub-obliquis, valde curvatis; fronte depressa, dentata, acuta; fossis oculorum magnis. Maxillipedum articulo secundo intrinsècus producto; tertio internè exciso, apice acuto apud angulum externum articulum quartum gerente ore quadrato: antennis externis brevibus profunde insertis, hiatum internum hæd implentibus.

Shell longitudinally convex, with the margin strongly carinate, and more or less toothed; sides of the body rather more oblique than in the neighboring genera, but far more vertical than in the *CANCERS*; front depressed, having its edge thin, dentate, and not recurved; ocular pedicles not much elongated, cornea occupying only a small portion of their inferior side; ocular cavities very large, rather irregular, and leaving an extremely wide space at the internal angle; external antennæ very short, having their basal joint deeply seated, while the terminal ones do not fill up one-fourth of the orbital hiatus; internal antennæ folded transversely in very narrow fossæ, which are almost concealed under the front; lateral pillars of the mouth straight; external appendage of the maxillary feet slender, but not linear, and bearing a rather long palpus at its extremity; second joint of the external maxillary feet produced antero-internally, having the base of the third lying, for the most part, on its outer side; third joint produced antero-externally, with the apex somewhat acute,

and bearing the palpus on the inner side of the external angle; the arrangement is such that when the maxillary feet are brought together, the apices diverge, leaving between them a nearly semi-circular excavation; epistoma broad, and nearly on a line with the floor of the orbits; tail broad in the males, but extremely so in the females.

O. dentata. Mus. Acad.

Testa granulata, margine utrinque 10-dentata; fronte multidentata, obtuse bilobata.

Orbits of the eyes dentate inferiorly; regions of the carapax not very strongly defined, antero-lateral margin with ten teeth on each side; front greatly depressed, but not vertical, obtusely bilobate, and armed with fifteen or more small but sharp teeth; anterior feet moderately elongate; arm with one strong tooth on the under side; carpus slightly roughened, one strong tooth on its anterior inner side; hands unequal in both sexes, but especially so in the male, the right being largest; pincers carinate, large, and irregularly toothed, the large tooth being separated by several smaller ones; four posterior pairs of feet somewhat flattened; tarsi much flattened, and carinate both on their superior edge and laterally. Color reddish.

Length, as measured in four specimens, from 1½ inches to 2 inches.

Supposed to have been brought either from South America or the West Indies.

This species has, at first sight, much resemblance to the *CANCERS*, owing to the breadth of its lateral crest.

Fam. *Ocypodidæ*.

Genus OCYPODE, (Fabr.)

O. rhombea, (Fabr.) Mus. Acad.

Two specimens, brought from the Sandwich Islands by Mr. J. K. Townsend.

Fam. *Macrophthalmidæ*.

Genus MACROPTHALMUS, (Latr.)

M. compressipes. Mus. Acad.

Manibus compressis, transverse carinatis; testa depressa, transversa, margine utrinque tridentata.

Ocular pedicles more than three-fourths as long as the whole width of the carapax, whose length is to the breadth as three to four in the males, but a little broader in the females; antero-lateral margin with three spines, the foremost one longest; feet flattened and bordered with long hairs; hands greatly flattened, broad, and inferiorly carinate on their external surface. Probably allied to *M. carinimanus*, (Latr.)

Sandwich Islands, J. K. Townsend.

Fam. *Grapsidæ*.

Genus SESARMA, (Say.)

S. recta. Mus. Acad.

Corpore quadrato, testa rugosa, antice convexa, margine carinata, utrinque pone oculos unidentata.

Carapax convex before the middle, and entirely

covered with wrinkles, the anterior ones plicate, some of them bearing tufts of hairs; median impression distinct; front vertical, profoundly four-lobed, lobes truncate, edge sinuous, profoundly excavated; epistoma granulous; buccæ and lateral regions of the body very strongly reticulate; anterior feet at least twice the length of the body, and very stout; arm with a notch on its upper edge; carpus with dense rugæ, resembling rows of confluent tubercles; hand convex, very broad, less rough than the carpus, its upper edge quite sharp; pincers stout, with tuberculous edges, their prehensile side armed with unequal teeth; thighs of the four posterior pairs of feet with plicæ, extending upon the upper edge and giving it a somewhat dentate appearance, one tooth near the extremity; antepenultimate joint sulcate, the last a little hairy on its upper edge; tarsi long and sharp; striate with hairs.

Length about $1\frac{2}{10}$ inches.

A single specimen, (a male,) labelled as brought from Surinam by Dr. Herring.

Genus GRAPSUS.

G. hirtus, (*GRAPSE rude?* Edw.) Mus. Acad.

Testa depressa, striata, hirta, scabrosa, margine 2-dentata, manibus parvis.

Front vertical, profoundly lobed, greatly produced, less than one-half as broad as the anterior portion of the shell; body entirely brown, with a few obscure spots; carapax depressed, scabrous, transversely striate, and covered with short, stiff

bristles; margin with two teeth, placed as in *G. pictus*; feet greatly flattened, with numerous transverse plicæ, lined each with hairs similar to those of the carapax, antepenultimate pair much longer than the rest, the anterior pair small, internal carpal tooth not dilated, but nearly spiniform.

The body is less dilated, more scabrous, and the front narrower and rather more produced than in *G. pictus*; the anterior feet are yet smaller than in that species, and the carpal tooth more spiniform.

Inhabits the Sandwich Islands; one specimen, (a male,) brought by Mr. Townsend.

G. longipes. Mus. Acad.

Testa striata, margine utrinquè 2-dentata; fronte tuberculosa; pedibus anterioribus elongatis, crassis, infra valdè spinosis, carpis tuberculosus, manibus vix convexus, valdè dilatatis.

Shell of a pale flesh color, profoundly striate; sides less dilated posteriorly than in the *G. pictus*, (of authors;) antero-lateral margin bidentate, the anterior tooth nearly on the same line with the posterior; front vertical, occupying more than one-half the width of the carapax anteriorly, its surface with many large tubercles; anterior feet in the male nearly twice the length of the carapax, but only about one-half longer than the carapax in the female, armed on each side beneath with great spines; carpus covered with great spiniform tubercles; hands not very convex but greatly dilated, more or less roughened on the outer side, having spiniform

tubercles on the upper and under side, and scattered tubercles on the inner ; pincers stout, tuberculous on their outer edges and obtusely dentate on their prehensile side ; four posterior pair of feet greatly flattened ; terminal joint with some long hairs ; tarsi long, sharp, and very spinous.

Length, as measured in two specimens, about $1\frac{7}{16}$ inches ; supposed to have been brought from Surinam by Dr. Herring.

This species may, perhaps, terminate that section of the true GRAPSI of M. Edwards, in which the third joint of the external maxillary feet is longer than broad ; from these we will separate the following species of M. Edwards' second division, and place them in the

Genus PACHYGRAPSUS.

Maxillipedum articulo tertio haud longiore quàm lato, externè dilatato ; fronte levitè depressa ; corpore quadrato vel posticè retracto ; cœtera GRAPSO similis.

In these, the third joint of the external maxillary feet is as broad as long, more or less rounded on its outer side, and generally considerably dilated at its anterior inner angle, the front is not vertical, but simply inclined ; the body is either nearly square or retracted behind ; it is generally thicker, and its parietes firmer than in the GRAPSI of the first division, and the anterior feet are usually very large and strong.

P. crassipes. Mus. Acad.

Testa anticè convexa, transversè striata, utrinquè 2-dentata; fronte producta, suprà 4-lobata; corpore crasso, posticè gradatim retracto.

Body very stout, carapax convex anteriorly, with two stout teeth on each side, including that which forms the outer angle of the eye; disk anteriorly and laterally striate, the striæ accompanied, for the most part, by yellowish lines; front considerably depressed, with four rounded lobes above, all very convex, and resembling great tubercles; frontal edge obtuse, rather prominent, nearly straight, a little sinuous near the angles; anterior feet nearly smooth and very large in the male; the surface of the carpus lightly rugose; four posterior pairs of feet much flattened; tarsi short, very stout and spinous.

Length about $1\frac{6}{16}$ inches; greatest breadth between $1\frac{7}{16}$ and $1\frac{8}{16}$ inches.

A single specimen (a male) brought by Mr. Nuttall from the Sandwich Islands.

This species seems to be nearly allied to the *GRAPSUS messor* of Forskal, but the carapax in that species has but one lateral tooth.

P. parallelus. Mus. Acad.

Testa quadrata, striata, polita, convexa, margine utrinquè pone oculos 1-dentata.

Shell quadrate, nearly flat on the upper surface, lightly striate anteriorly, but very profoundly on the sides, where the striæ become plicate, some of

them are produced quite upon the sides, in such a manner as almost to project from them; the margin presents only one tooth, which forms the outer angle of the orbit, and is quite stout, median impression of the carapax and lateral furrow on each side of it very profound; front moderately inclined, and not greatly prominent, divided into four quadrate lobes flattened above, frontal edge nearly straight, or lightly sinuous; hand only moderately large in the male and small in the female, more or less rough; four posterior pairs of feet polished, nearly smooth; tarsi moderately long, and terminated by a long, slender, corneous nail; the third joint of the outer maxillary feet is much rounded on the outer side, and apparently somewhat concave. The color varies, but is usually yellow and brown mingled, minutely dotted with black; legs paler, dotted with black. Sometimes the whole body is pale yellowish or clay colored.

Length about $1\frac{1}{4}$ inches.

The females seem to be more numerous and smaller than the males.

Several specimens, brought by Nuttall and Townsend from the west coast, near the mouth of the Columbia river, and from the Sandwich Islands.

Genus *PLAGUSIA*, (Latr.)

P. planissima, (CANCER *planissima*, Herbst.)

(*P. clavimana*, Desmarest.) Mus. Acad.

Brought from the Sandwich Islands by J. K. Townsend, but is larger than usually represented, being about $1\frac{1}{16}$ inches in length.

Fam. *Calappiadae*.

Genus CALAPPA, (Fabr.)

C. tuberculata, (Fabr.) Mus. Acad.

Brought in great numbers from the Sandwich Islands by Nuttall and Townsend.

Fam. *Leucosiadae*.

Genus ILIA, (Leach.)

I. ornata. Mus. Acad.

Corpore globoso, vix granulato; testa polita, maculis sanguineis confluentibus, ornata.

Body globose; shell nearly smooth, with only a few granules anteriorly, some inconspicuous tubercles on the lateral edge, one large one on each side of the buccal regions; another, large but scarcely elevated, above it, and one, small but distinct, on each side posteriorly; two spines placed near each other at the apex, and one tubercle above them; disk variegated with sanguineous spots, confluent anteriorly; anterior feet variegated with red, about one-half as long again as the carapax in the female; arms granulous; epistoma dilated, leaving a considerable space between the eyes and the apex of the outer maxillary feet.

Length $1\frac{2}{10}$ inches.

The description is made out from female specimens, brought from Upper California by Mr. Nuttall.

Compared with *CANCER punctatus*, it is smaller, the body more smooth, more convex above, the spots greater and more confluent; the two lateral spines of the apex are nearer to one another than to the posterior feet, and the spine above them is reduced to a tubercle, or to two or three slight granules; moreover, the epistoma in *C. punctatus* is linear, and does not leave a considerable space between the eyes and the apex of the outer maxillary feet.

DECAPODA ANOMOURA.

Fam. *Raniniadæ*.

Genus *RANINA*, (Lamarck.)

R. serrata, (Lam.) (*R. dentata*, Latr.) Mus. Acad.

Inhabits the Sandwich Islands, whence several specimens have been brought by J. K. Townsend.

Fam. *Hippiadæ*.

Genus *BLEPHARIPODA*.

Testa ovato-oblonga; antennæ quatuor, elongatæ, inequales, ciliatæ, externis longioribus, revolutis; intermediis biappendiculatis. Pedunculi oculorum distinctè triarticulati. Pedes maxillarii externi elongati, involuti, articulo primo brevi, reliquis elongatis, tertio cylindrico, ultimo angustato, os non cælantes. Pedes ciliati, angulati; duodidactyli antici.

Shell oblong-ovate, a little retracted behind; antennæ four, unequal, the external being much the

greatest, with one long revolute appendage, which is ciliate on the outer side; the internal with two appendages, which are ciliate on the inner side, ocular pedicles exposed to their bases, and distinctly triarticulate; external maxillary feet involute, pediform, not closing the mouth, the basilar joint very stout, the rest longer, the third joint nearly cylindrical, and the terminal one subacute, external appendage produced nearly to the tip of the third joint, and rather strong; feet strong, ciliate, their bases approximate, their edges sharp, and the tarsi falcate, anterior pair extremely large at base, hands didactyle.

B. occidentalis. Mus. Acad. Pl. VI.

Testa polita, transverse impressa, lateribus utrinque 4-spinosis, fronte trispinosa.

Shell convex, somewhat obliquely elevated toward the centre, which is faintly carinate; a median transverse sinuous impression, behind which the surface is polished, but anterior to it, densely marked with small transverse impressions, most of which are pectinated and hairy; a lateral transverse impression, and a very profound oblique one connected with it inferiorly; frontal edge strongly three-toothed, and excavated between the teeth; a distinct post-frontal transverse groove, behind which is a strong tooth; antero-lateral margin of the carapax with four stout teeth on each side; posterior margin excavated; second, third, and fourth pairs of feet

more or less roughened laterally, and with the anterior edge minutely dentate; anterior pair stout; arm with a strong tooth near its anterior inferior extremity; carpus elongate, rather convex, laterally impressed, and having on its upper anterior edge a great spiniform crest, which is itself bordered with smaller spines; hand flattened on the side, and armed with two or three strong, sharp teeth, having between them a great multitude of impressions, similar to those of the carapax; pincers flattened, acute at tip and armed with sharp, spiniform teeth, both on their outer edges, and on their prehensile side.

Length about two inches, in the only specimen preserved in the collection, which was found by Mr. Nuttall at San Diego, in Upper California.

It may be considered as a connecting link between *RANINA* and *ALBUNEA*.

Genus HIPPA, (Fabr.)

H. emeritus, (Fabr.) Mus. Acad.

Brought from the Sandwich Islands by Nuttall and Townsend, who describe it as being abundant there.

The *HIPPA talpoida*, of Say, does not differ from this species.

Fam. *Paguridæ*.

Genus PAGURUS, (Fabr.)

P. punctulatus, (Edwards.) Mus. Acad.

Brought from the Sandwich Islands, by Messrs. Nuttall and Townsend.

It inhabits the *DOLIUM ringens*, the *TRITON variegatum*, and other large shells.

Average length of thorax, four to five inches.

P. deformis? (Edwards.) Mus. Acad.

A specimen, brought from the Sandwich Islands by J. K. Townsend, agrees with the description of this species by M. Edwards, excepting that the second and third pairs of feet are tuberculous; if this should prove to be an invariable character, the present species may be named *P. carinatus*.

Length of thorax in the only specimen procured, rather more than 1½ inches.

P. symmetricus. Mus. Acad.

Pedibus cylindricis, manibus tuberculosus, æqualibus, vix setosis, infra valdè convexis, pedunculis oculorum gracilibus.

Eyes very small, scarcely one-fifteenth of the length of the ocular pedicles, which are somewhat three-sided, slender, rather long, being nearly twice as long as the basilar appendage of the external antennæ, though not so long as the anterior margin of the carapax, which is provided with a small, somewhat rounded rostrum; anterior feet equal, of moderate size, tuberculous above and beneath, but less so on their outer surface, hardly hairy, beneath very convex and forming, laterally, nearly a straight line with the fingers, which, for a considerable distance at their extremities, unite by a black margin, and, when closed, form a nearly oval body; second and third pairs of feet long, slender, cylindrical,

somewhat rugose, but hardly tuberculous, and marked, together with the tarsi, which are at least one-fifth longer than the preceding joint, with tufts of short hairs, or with depressions, from which the hairs have been removed; these depressions sometimes form an interrupted sulcus on the upper side of the tarsus. Color yellowish; length of carapax rather more than an inch, but perhaps becomes larger by age.

It is labelled as having been brought by Dr. Herring from Surinam, and may, perhaps, be allied to *P. oculatus*, (Fabr.) and to *P. crassimanus*, (Edw.) it has much resemblance, in form, to the *P. Labillardieri*, (Savigni, Egypt, Crust., Pl. 9, fig. 2.)

A small specimen, evidently of the same species, is preserved in the collection, labelled as having been found in the East Indies by J. Longstreth.

P. decorus. Mus. Acad.

Testa polita, profundè punctata, fronte rostrata, manibus ferrugineis, tuberculis, apicè digitorum albo, pedibus annulis coccineis cinctis.

Anterior portion of the thorax longer than broad, front with a very small rostrum; eyes extremely small, pedicles slender, bluish, rather longer than the anterior margin of the shell, and more than twice as long as the appendage of the external antennæ; carapax bluish, with numerous large punctures, having their cavities pale; antennæ bright orange; anterior feet dark reddish, carinate above, with somewhat short, triangular, very unequal hands studded with white tubercles; the fingers

white at tip ; two following pairs of feet compressed, black or dark red, with the articulations of the joints bright vermilion ; the tarsi short, stout, color bright vermilion, marked with black spots, from each of which grows a small tuft of hairs ; the under side of the tarsus sometimes very densely tufted with long, thread-like, pinkish hairs.

Length one inch to $1\frac{1}{2}$ inches.

Found by Mr. Nuttall at the Sandwich Islands, inhabiting the shells of various species of TURBO.

Probably allied to the *P. chilensis*, (Edwards,) and to the following :

P. elegans, (Edwards.) Mus. Acad.

Specimens, apparently of this species, brought by Mr. Nuttall from the Sandwich Islands.

Two other small species of PAGURUS, allied to the above, have been brought also from the Sandwich Islands by Mr. J. K. Townsend, the first may be named

P. levimanus. Mus. Acad.

Having the hands entirely smooth, pink above and white beneath, the right very large ; legs reddish, tarsi paler, with a red spot on each side. The ocular pedicles are about the length of the anterior margin of the carapax.

The following may be called

P. latens. Mus. Acad.

In which the ocular pedicles are rather longer

than in the preceding, and the anterior feet granular; right hands with a sharp dentate crest on the upper side. Color bluish or reddish, the feet in some banded alternately with blue and red.

Genus CENOBITA. (Latr.)

C. *Diogenes*. (Auctorum.) Mus. Acad.

A specimen of this species was brought by Mr. Nuttall, supposed to have been found at the Sandwich Islands.

Fam. *Porcellaniadae*.

Genus PORCELLANA, (Lam.)

P. *cinctipes*. Mus. Acad.

Testa polita, anticè levitèr granulata, posticè levitèr striata; fronte canaliculata, pedum pare antico granulato, carpis unispinosus; reliquis albo-fasciatis.

Shell obtusely hexagonal, about as long as broad, exclusive of the front, which is triangular, prominent, profoundly canaliculate, and presenting on each side at base the germ of a dentiform lobe; carapax punctured in the middle, granular anteriorly, and striate on each side posteriorly, sides surrounded by a very prominent crest; color reddish-brown anteriorly, blue postero-laterally; anterior feet granular above, smooth, and highly polished underneath, carpus with a prominent ridge near the outer edge, terminating in a tooth; inner extremity only a little crenate; hands triangular, outer edge sharp; three posterior pairs of feet flattened, their color blue, fasciate with white.

Length a little over six-tenths of an inch.

Brought by Mr. Nuttall from the Sandwich Islands.

DECAPODA MACROURA.

Fam. *Scillaridæ*.

Genus SCILLARUS, (Fabr.)

S. latus, (Latr.) Mus. Acad.

Two specimens, brought from the Sandwich Islands by Messrs. Nuttall and Townsend.

Genus IBACUS, (Leach.)

I. antarcticus, (Fabr.) Mus. Acad.

Several specimens, taken with the preceding at the Sandwich Islands, by Messrs. Nuttall and Townsend.

Fam. *Palinuridæ*.

Genus PALINURUS, (Fabr.)

P. interruptus. Mus. Acad.

Testa antice spinosa, postice tuberculata; epistoma 7-spinosa; fronte bicorni abdominis segmentis interruptè sulcatis; pedibus vittatis.

Thorax with large spines anteriorly, and large flattened tubercles posteriorly, and armed in front with two very stout horns, having their apices subapproximate; epistoma with seven spines, the middle one largest; spaces between the thoracic spines and tubercles depressed and hairy; joints of the external antennæ covered with large spines; oph-

thalamic ring armed above with four spines, placed two and two, the anterior pair being larger than the others; abdomen with obsolete, minute spots, and scattered punctures; segments each with a profound, hairy, transverse sulcus, not reaching the middle, excepting on the last segment, where it is scarcely interrupted; feet vittate alternately with red and olivaceous.

Length from five to nine inches, as measured in two specimens, brought by Messrs. Nuttall and Townsend from Upper California, where it is used as food by the natives.*

It is probably allied to the *P. Argus*, (Latr.), and to *P. dasypus*, (Latr.)

Fam. *Astacidae*.

Genus *ASTACUS*, (Fabr.)

A. oreganus. Mus. Acad. Pl. VII.

Testa granulata, bimaculata, fronte valde producta.

Body fuscous, granulated, carpus with a sharp spine at the interior inner angle; arm produced into a spine on each side anteriorly; thorax behind the front with five spines, placed three before, and one on each side behind the lateral ones; a large reddish spot on each side posteriorly; front little reflexed on the sides, terminating in a very long, slender spine, and having a short, marginal spine on each side.

Length about four inches.

* Since the above description was written, Mr. Nuttall informs me that he has found specimens of this species two feet in length.

Taken by Mr. Nuttall in the Columbia river, west coast of North America.

Genus NEPHROPS, (Leach.)

N. occidentalis. Mus. Acad.

Thorace lanuginoso, spinis in serie triplici dispositis; manibus prismaticis, villosis.

Thorax downy, armed above with three rows of strong spines, the middle row commencing behind the others, and composed of five or six teeth; the lateral rows have also about six teeth, and are continued upon the base of the rostrum, but terminate within the point at which the marginal spines of the front commence; these latter are in number four on each side, and a terminal one common to both; parallel with the fifth spine of the lateral thoracic row, and on the outer side of it, is a strong spine, almost imperceptibly cleft at base; no tubercles are visible on any part. Anterior feet very spinous above, and underneath; hands somewhat prismatic, with from three to five rows of tubercles, more or less spiniform on both the inner and outer face, the lateral ones ill defined, but the middle row very distinct; the left hand is rather the larger, and the upper and under surface of both, together with the prehensile side of the pincers, and almost the whole surface of the maxillary feet covered with very long, coarse hairs; segments of the abdomen sculptured as in the *N. norvegicus*.

Length half a foot.

Brought from the west coast of North America by Mr. Nuttall.

Fam. *Alpheidæ*.Subgenus *ATYOIDA*.

Pedum pare tertio elongato, gracili, cœtera *Atyæ* similis.

It is essentially similar to the genus *ATYA*, of Leach, excepting the third pair of feet, which are elongate, gradually retracted toward the apex, and scarcely stronger than the two anterior pairs; the terminal joint is not broader at its extremity than the base of the tarsus.

A. bisulcata. Mus. Acad. Pl. V., fig. 5.

Testa polita, transverse sulcata, margine anteriori utrinquè bispinosa, rostro producto, valde acuto, utrinquè bisulcato.

Maxillary feet not attaining the extremity of the basal scales of the external antennæ, which are densely clothed with black hairs at their extremities, and greatly exceed the peduncle of the internal antennæ; thorax smooth, with a transverse sulcus behind the middle; a spine on the anterior margin of the thorax, between the rostrum and the outer angles, which are also produced into a spine; rostrum commencing from the base of the front, produced to a very fine point, and having a profound sulcus on each side; the front is so much elevated on its margin, that the two sides, together with the rostrum, present, at first sight, the appearance of a triple carina; terminal appendages of the abdomen smooth.

Length about one inch.

Brought by Mr. Nuttall from the Sandwich Islands.

Genus ALPHEUS, (Fabr.)

A. brevirostris? (Edw.) Mus. Acad.

Dr. Burroughs has brought from Manilla a species of ALPHEUS, agreeing with M. Edwards's description of *A. brevirostris*, with this exception, that it has a distinct tooth on the outer side of the basilar article of the external antennæ; there is also a somewhat elevated ridge on the outer side of the arm. I have named it, provisionally, *A. dispar*.

Another species of ALPHEUS has been brought from the Sandwich Islands by Mr. Nuttall, in which the orbital arches are considerably produced, and armed each with a short slender spine; the external side of the basal article of the external antennæ is continued into a sharp tooth; the rostrum is short, entire, and very pointed; the second article of the internal antennæ is about one-half longer than the first; the carapax is entirely smooth; hands smooth, the right one largest, the fingers very short, the moveable one very obtusely rounded.

Length about $1\frac{1}{4}$ inches.

I have named this species *A. lævis*. Mus. Acad.

Fam. *Palemonidae*.

Genus HIPPOLYTE, (Leach.)

H. marmoratus, (PALEMON *marmoratus*, Oliv.)

Mus. Acad.

Several specimens, brought from the Sandwich Islands by Mr. Nuttall.

The maxillary feet of the female are scarcely one-half the length of those in the male.

Another species of HIPPOLYTE, brought also by Mr. Nuttall from the Sandwich Islands, may be named *H. gracilipes*.

The whole surface of its body is roughened ; the thorax is furnished with a slightly elevated crest, commencing behind the middle of the carapax, and extending upon the rostrum, which is greatly compressed and produced downwards on the under side ; the thoracic crest is armed with three or four spines behind the rostrum, and the rostrum itself with seven or eight ; on its under side are a few long hairs, but no teeth ; external maxillæ only of moderate length ; feet slender, second pair elongate ; the carpus long, nearly cylindrical, greatly inflated toward the base, but greatly contracted at the point of the commencement of the fingers, which are as long as the carpus, very slender and slightly curved ; abdomen extremely gibbous.

Length nearly 1½ inches. Mus. Acad.

Genus PALEMON, (Fabr.)

P. grandimanus. Mus. Acad.

Thorace subcylindrico, rostro compresso, 15-dentato squamas antennarum æquante, antrorsum vix descendente ; pedum pare secundo longissimo, minutè spinoso, digitis modò in apice attigentibus.

Thorax nearly cylindrical, with a strong tooth on each side, and another scarcely visible behind it ; rostrum greatly compressed, dilated, almost straight,

and as long as the squamous plate of the external antennæ, armed with fifteen teeth on the upper side and with four beneath; second pair of feet very unequal, the left being considerably longer than the body; both are densely covered with almost invisible spines and close down; carpus about two-thirds of the length of the hand, very small at base, but gradually enlarging anteriorly; the left hand very large, being three times as thick as the arm, and considerably inflated; pincers about as long as the hand, and when closed leave a great space between their prehensile sides, which are armed each with one or more great teeth, and with as many smaller ones at base, their outer sides are marked with some black spots, more or less distinct; four posterior pairs of feet short and slender; eyes white.

Length about 2½ inches.

Length of the left foot of the second pair, 3½ inches.

Brought by Messrs. Nuttall and Townsend from the Sandwich Islands.

P. gracilimanus. Mus. Acad.

Rostro 13-vel 14-dentato, recto, squamis antennarum longiore; testa polita, utrinquè bispinosa; pedum pare secundo elongato, gracilibus, manibus verrucosis.

Rostrum rather broad, compressed, straight, but directed a little upwards at tip, a little longer than the basal plates of the antennæ, armed on the upper side with about thirteen teeth, and beneath with five or six serratures; a strong spine on each side the thorax, and a very small one behind it; second

pair of feet equal, nearly as long as the body rostrum inclusive, very slender, more or less tuberculous, or at least roughened; the carpus one-third longer than the hand, which last is a somewhat flattened cylinder, covered with minute tubercles, disposed in longitudinal rows, more or less distinct; pincers less long than the hand, uniting in their basal half, but leaving a slight space between them in their apical half.

Length from tip of rostrum to extremity of caudal appendages, about $3\frac{1}{2}$ inches.

Length of second pair of feet nearly three inches.

Found by J. K. Townsend at the Sandwich Islands.

The following species of *PALEMON* differs from the *P. jamacensis* in the second pair of feet, which are greatly longer than in that species, and more spinous; neither does it well agree with the *P. Lar*, (Fabr.) which Olivier says has a smooth thorax, moreover, the rostrum does not, in the present species, attain the extremity of the basal scales of the external antennæ by one-fourth; it differs in nearly these same respects from the *P. longimanus*, (Fabr.) which has the pincers smooth, according to Olivier, (Encyc. Meth.) The *P. ornatus* has only eight or ten teeth on the upper side of the rostrum, and the carpus is nearly the length of the palmar portion of the hand, and the feet, except the second pair, are nearly smooth; the same is the case with the *P. forceps*, (Edw.)

The following description will better determine its relationship.

Palemon testâ politâ, lateribus profundè punctatis, rostro squamis antennarum brevior, antrorsum descendente, 12-vel 13 spinoso; pedum pare secundo longissimo, spinoso, cylindrico.

Rostrum longer than the peduncle of the external antennæ, but not so long as their basal scales, somewhat descending anteriorly, and armed with twelve or thirteen teeth above, and three beneath; thorax smooth, except on the sides where it is almost reticulate with profound punctures; a strong spine on each side anteriorly, and a smaller one behind it; second pair of feet longer than the body, inclusive of the rostrum and caudal appendages, and covered in their whole extent with strong spines, those on the under side being largest, many of them nearly one-eighth of an inch in length; carpus scarcely three-fifths of the length of the palmar portion of the hand; pincers at least as long as the hand, very spinous, white at tip, where they are strongly crooked, the moveable one is armed with two or three small teeth, and the immovable with one; the two unite in their whole length, being formed much as in the *P. carcinus*, but in the specimen belonging to the Academy, which has only the foot of the right side remaining, they accidentally diverge; the carina, however, together with the groove which should receive it, are somewhat distinct; the remaining feet are all covered more or less with short spines.

Length eight inches, but perhaps becomes larger with age.

It is supposed to have been brought from the East Indies by Dr. Burrough.

The second pair of feet are stronger than in the *P. carcinus*, and far more spinous. I have named it *P. punctatus*. Mus. Acad.*

Genus PENŒUS.

P. canaliculatus, (Oliv.) Mus. Acad.

Many specimens, of a species agreeing with Olivier's description of this species, excepting that the rostrum is armed beneath with two teeth, instead of one, have been brought from the Sandwich Islands by Messrs. Nuttall and Townsend. The carapax is black, and bordered on each side behind with white; there are no spines at the base of the third pair of feet; the rostrum is armed with only nine teeth.

Length four to five inches.

If distinct from Olivier's species, I will name it *P. marginatus*.

CRUSTACEA STOMAPODA.

Fam. Squilliadæ.

Genus SQUILLA, (Rondelet.)

S. arenaria, (Rumph. et Herbst.) (*S. maculata*, Lamarck.) Mus. Acad.

Inhabits the Sandwich Islands, whence specimens have been brought by Mr. J. K. Townsend.

* I have, since writing the above, seen another specimen of this species, brought from the West Indies.

S. nepa, (Latr.) Mus. Acad.

Brought also from the Sandwich Islands by Mr. J. K. Townsend.

S. stylifera, (Lam.) Mus. Acad.

Brought in considerable numbers from the Sandwich Islands, by Messrs. Nuttall and Townsend.

Genus GONODACTYLUS, (Latr.)

G. styliferus, (Edwards.)

A single specimen of this species has been brought from the Sandwich Islands by Mr. Townsend; the color of the hands is bright blue.

Reference to Plates accompanying the Paper.

Plate III. EPIALTUS *Nuttallii*, page 109.

" IV. THALAMITA *pulchra*, page 117.

" V. Fig. 1, 2, and 3. ORTHOSTOMA *dentata*, page 122.

" " Fig. 4. PACHYGRAPSUS, page 126.

" " Fig. 5. ATYOIDA *bisulcata*, page 140.

" VI. BLEPHARIPODA *occidentalis*, page 131.

" VII. ASTACUS *oreganus*, page 138.

*Description of a New Species of CYPCELUS, from
the Columbia River.* By JOHN K. TOWNSEND.

Read March 5th, 1839.

CYPCELUS Vauxii.

BILL slender, black; upper parts of a dull smoke-brown, inclining to blackish upon the interscapular region; shoulders and primary quills blackish; the rump and tail are of a much lighter color than the back, being dull cinereous-brown; shafts of the tail-feathers, and their points, black; wings of ordinary length, extending about two inches beyond the tail; throat, and upper portion of the breast, grayish-white; belly, and all below, cinereous-gray. Legs and feet brownish-black. Irides dark hazel. Length $3\frac{1}{4}$ inches. Extent of wings 10 inches. It differs from the *C. pelasgius*, with which it has been confounded, in several very striking particulars. It is one inch shorter, and two inches less in extent; the body is proportionably smaller in every aspect, and the color much lighter.

This species (which I dedicate to my friend, Wm. S. Vaux, Esq., of Philadelphia) is common on the Columbia river; breeds in hollow trees, forming its nest in the same manner as the *pelasgius*, and lays four white eggs.

*Description of a New Species of SYLVIA, from the
Columbia River.* By JOHN K. TOWNSEND.

Read April 2d, 1839.

SYLVIA *Tolmæi*, Tolmie's Warbler. Audubon's Birds of America, Vol. IV., pl. 399, male and female. (*S. philadelphia* in the plate.)

The bill is brownish above, pale flesh-color beneath, darker at the point; lores, and narrow frontlet, black; whole head, neck, and upper part of the breast, dark sooty-ash, the feathers of the latter fringed with white; upper parts greenish-yellow-olive; the tail brighter, and of a uniform color, without spots; wings lightish-cinereous, the exterior vanes of all the feathers, including the coverts, yellow. Legs and feet flesh color. Length 5 inches. Extent of wings $6\frac{1}{2}$ inches.

The female differs from the male, chiefly by having the head and throat light ash color, without any black, and in being destitute of the black frontlet and lores.

This pretty species, so much resembling the curious *S. philadelphia*, of Wilson, is common in spring on the Columbia. It is mostly solitary, and extremely wary, keeping chiefly in the densest and most impenetrable thickets, and gliding through them in a very cautious and suspicious manner. It may, however, sometimes be seen, towards mid-day, perched upon a dead twig, over its favorite place of concealment, and at such times it warbles a sprightly and pleasant little song, raising its head until the

bill is almost vertical, and swelling its throat in the manner of its relatives.

I dedicate this species to my friend W. F. Tolle, Esq., of Fort Vancouver.

An Analysis of Marl from New Jersey.

By S. S. HALDEMAN.

Read May, 1839.

I TAKE this opportunity to forward an analysis of a specimen of the peculiar concretions found in the New Jersey greensand. Some of these are tubular, having been formed, or concreted, (as I discovered,) *around vegetable fibre, or lignite*. The greensand itself frequently occurs in the same manner.

Mineral Characters.—Color bluish-white on the surface; light chocolate upon a fresh fracture; soft, and easily broken; generally irregularly cylindrical, sometimes tubular. The surface covered with grains of greensand.

Analysis, (a single trial.)

Silica,	82.09
Alumina,	9.10
Oxide of Iron,	1.31
Water,	5.65
Volatile matter,	1.85
	<hr/>
	100.00

List of the Birds Inhabiting the Region of the Rocky Mountains, the Territory of the Oregon, and the North West Coast of America. By JOHN K. TOWNSEND.

Read September 10th, 1839.

The species recently discovered and described, are designated by an. Those which have been seen, but not characterized, are marked thus §.*

LAND BIRDS.

CATHARTES *californianus*.

" *aura*.

FALCO *sparverius*.

" *columbarius*.

" *albicilla*?

" *leucocephalus*.

" *haliaetus*.

" *fuscus*.

" *borealis*.

" *cyaneus*.

" *peregrinus*.

" *lagopus*.

" *æsalon*.

" *buteo*.

" *hyemalis*.

" *Cooperii*.

" *sancti-johannis*.

STRIX *asio*.

" *nævia*.

" *virginiana*.

" *cinerea*.

STRIX *brachyotus*.

" *acadica*.

" *otus*.

" *Tengmalmi*.

" *cunicularia*.

" *passerinoides*.

STURNUS *ludovicianus*.

ICTERUS *phæniceus*.

" *zanthrocephalus*.

" *Bullockii*.

" **tricolor*, (Aud.)

" **gubernator*.

QUISCALUS *ferrugineus*.

CORVUS *corax*.

" *americanus*.

" *ossifragus*.

" *pica*.

" (*Nucifraga*) *columbiana*.

GARRULUS *Stelleri*.

" *ultramarinus*

" *canadensis*.

PARUS *atricapillus*.

" **rufescens*, (Towns.)

" **minimus*, (Towns.)

BOMBYCILLA *carolinensis*.

LANIUS *borealis*.

" *ludovicianus*.

MUSCICAPA *tyrannus*.

" *Cooperii*.

" *verticalis*.

" *Saya*.

" *fusca*.

MUSCICAPA *virens*.

- " *pusilla*, (Sw.)
- " *Traillii*.
- " *acadica*.
- " *Richardsonii*, (Sw.)
- " *nigricans*, (Sw.)

ICTERIA *viridis*.VIREO *solitarius*.

- " *gilvus*.
- " *noveboracensis*.

PTILIOGONYS **Townsendii*, (Aud.)TURDUS *migratorius*.

- " *nævia*.
- " *minor*.
- " *Wilsonii*.
- " *aurocapillus*.
- " § *Townsendii*, (Aud.)
- " (*orpheus*) **montanus*, (Towns.)
- " *nanus*, (Aud.)

CINCLUS *americanus*, (Sw.)SYLVIA *æstiva*.

- " *trichas*.
- " **Delafieldii*, (Aud.)
- " **Tolmæi*, (Towns.)
- " *azurea*.
- " *Wilsonii*.
- " *celata*.
- " **Townsendii*, (Nutt.)
- " **nigrescens*, (Towns.)
- " **Auduboni*, (Towns.)
- " **occidentalis*, (Towns.)

REGULUS *calendula*.

" *cristatus*.

TROGLODYTES *fulvus*.

" *Benwickii*.

" **Parkmanii*, (Aud.)

MYIOTHERA *obsoleta*.

SIALIA *arctica*, (Sw.)

" **occidentalis*, (Townsend.)

ANTHUS *spinoletta*.

ALAUDA *cornuta*, (Wils.)

EMBERIZA *nivalis*.

" *pallida*, (Sw.)

TANAGRA *ludoviciana*.

FRINGILLA **Mortoni*, (Aud.)

" *amæna*, (Say.)

" *leucophrys*.

" *graminea*.

" *socialis*.

" *tristis*.

" *pinus*.

" *purpurea*.

" *arctica*.

" **oregona*, (Townsend.)

" *atricapilla*, (Gm.)

" *cinerea*, (Gm.)

" **Townsendii*, (Aud.)

" *canadensis*.

" *vespertina*.

" *grammaca*.

" *maculata*.

" *pusilla*.

" **chlorura*, (Aud.)

- FRINGILLA **bicolor*, (Towns.)
" (*plectrophanes*,) **ornata*, (Towns.)
" *savanna*.
LOXIA *curvirostra*.
COCYZUS *americanus*.
PICUS *mexicanus*.
" *pileatus*.
" *imperialis*.
" *§pyrrhonotus*, (Aud.)
" *torquatus*.
" *lineatus*.
" *ruber*.
" **Harrisii*, (Aud.)
" **Gairdnerii*, (Aud.)
SITTA *carolinensis*.
" *canadensis*.
CERTHIA *familiaris*.
TROCHILUS *rufus*.
" *anna*.
ALCEDO *alcyon*.
HIRUNDO *purpurea*.
" *fulva*.
" *bicolor*.
" *riparia*.
" *thallassina*.
" *rufa*.
CYPSELUS **Vauxii*, (Towns.)
CAPRIMULGUS *virginianus*.
" *§Nuttallii*, (Aud.)
COLUMBA *migratoria*.
" *fasciata*.
" *carolinensis*.

PERDIX *plumifera*, (Gould.)

TETRAO *umbellus*.

“ *obscurus*.

“ *urophasianus*.

“ *canadensis*.

“ *phasianellus*.

“ *leucurus*.

PHASIANUS *americanus*, (Aud.)

WATER BIRDS.

HÆMATOPUS **Townsendii*, (Aud.)

“ **Bachmanii*, (Aud.)

CHARADRIUS *vociferus*.

“ **montanus*, (Towns.)

GRUS *americana*.

ARDEA *herodias*.

“ *nycticorax*.

RECURVIROSTRA *americana*.

NUMENIUS *longirostris*.

“ *borealis*.

TRINGA *alpina*.

“ *Wilsonii*.

“ *semipalmata*.

TOTANUS *macularis*.

“ *flavipes*.

“ *semipalmatus*.

APHRIZA **Townsendii*, (Aud.)

LIMOSA *fedoa*.

SCOLOPAX *Wilsonii*.

“ *Drummondii*.

- SCOLOPAX *grisea*.
RALLUS *carolinus*.
FULICA *americana*.
PHALAROPUS *Wilsonii*.
 " *hyperboreus*.
 " *fulicarius*.
PODICEPS *minor*.
 " *rubricollis*.
STERNA *nigra*.
LARUS *canus*.
 " **occidentalis*, (Aud.)
THALASSIDROMA *Wilsonii*.
 " *Leachii*.
PROCELLARIA *gigantea*.
 " **pacifica*, (Aud.)
 " **tenuirostris*, (Aud.)
DIOMEDEA **fusca*, (Aud.)
 " **chlororhynchos*, (Aud.)
 " **nigripes*, (Aud.)
ANSER *hypoboreus*.
 " *albifrons*.
 " *canadensis*.
 " *Hutchinsii*.
CYGNUS *americanus*, (Sharpless.)
 " *buccinator*.
ANAS *boschas*.
 " *americana*.
 " *sponsa*.
 " *crecca*.
 " *chlypeata*.
 " *obscura*.
 " *acuta*.

FULIGULA *perspicillata*.

" *marila*.

" *valisneria*.

" *rufitorques*.

" *histrionica*.

" *clangula*.

" *glacialis*.

" *dispar*.

MERGUS *merganser*.

" *cucullatus*.

PELECANUS *onocrotalus*.

" *fuscus*.

PHALACROCORAX **splendens*, (Towns.)

" **Townsendii*, (Aud.)

" *§leucurus*, (Aud.)

" *§leuconotus*, (Aud.)

COLYMBUS *glacialis*.

URIA **Townsendii*, (Aud.)

" *grylle*.

" *antiqua*.

PHALERIS *nodirostris*.

" *cristatella*.

CERATORHYNCHA *occidentalis*.

Note on SYLVIA Tolmæi. By JOHN K. TOWNSEND.

Read September 10th, 1839.

WHEN I first procured this bird on the Columbia River in the spring of 1835, I considered it an undescribed species, and have never since seen reason to renounce the opinion then formed. Specimens, in several varieties of plumage, were sent by me to the Academy in the following year, from among which Mr. Audubon selected several. A pair of these are figured in the 4th volume of his splendid work, under the title of *SYLVIA philadelphia*, for which species Mr. A. always mistook it.

Being myself thoroughly convinced, that this usually accurate naturalist was for once mistaken, I ventured to insert a description of this bird in an appendix to my recently published work, "Narrative of a Journey Across the Rocky Mountains, &c." and honored it with the name of my friend Dr. W. Fraser Tolmie. At a subsequent period, Mr. Audubon, aware of his former error, relinquished the name of *S. philadelphia*, and in Vol. V. of his "Ornithological Biography," page 75, called the species *S. Macgillivrayi*.

If I had been aware, before the publication of my appendix, of Mr. Audubon's wish to name this bird, I should have adopted his appellation with cheerfulness; but as his intention was never communicated to me, the name of *S. Tolmæi*, which I have given it, having priority, must of course be retained.

Description of the White-winged Tanager, (PYRANGA leucoptera.) By J. TRUDEAU.

Read June 4th, 1839.

BILL shorter than the head, convex, hard, of a bluish-black,—above and below of a rich crimson-red; anal region paler; a band of deep black around the bill and eyes. Wings and tail black; on the former two white bands. Primaries (the first is shorter than the second and third, which are the longest) edged with pale ash. Secondaries tipped with white. Inside of the wings of a pure white. Tail slightly rounded. Tarsi shorter than the middle toe, of a bluish-black, and about eight lines long. Length five inches nine lines. Iris hazel.

From Mexico. No information of its habits.

Description of a Species of Land Tortoise, from Africa. By EDWARD HALLOWELL, M. D.

THE genus KINIXIS, the most remarkable among the family of land tortoises, was established by Mr. Bell, in 1827. The most striking character in this genus consists in the mobility of the posterior portion of the carapace, which may be brought at will in contact with the sternum. This motion is not effected through the agency of a ligamentous hinge, as is the case in the CHELONIANS with a moveable *sternum*, but exists chiefly in the bony structure itself, which is nearly diaphanous, and, in the living animal, possesses a certain degree of elasticity.

A living specimen of this genus was recently received from Liberia, by my friend, Dr. Blanding, to whom I am indebted for the opportunity of describing such portions of it as remained unnoticed, and also of correcting an error respecting the line of flexion of the carapace, the position of which, in the dead animal, cannot well be determined.

KINIXIS.

Generic Characters.—Carapace moveable posteriorly; anterior extremities with five toes, posterior with four only; sternum immoveable.

KINIXIS *denticulata*, (Pls. VIII and IX.)

Characters.—Carapace oblong ovate, rounded and

broader posteriorly; free margin strongly denticulated; sides carinated; no nuchal plate; supra caudal single.

SYNONYMES.

TESTUDO denticulata, (pullus,) Shaw, Gen. Zool., Vol. III, p. 59, pl. 13.

TESTUDO erosa, Schweigg., Prodröm., Archiv. Kœnig., tom. I, p. 321.

KINIXIS castanea, Bell, Linnæan Transact., Vol. XV, p. 392, pl. 17, fig. 1.

KINIXIS erosa, Gray, Synop. Reptil., p. 16.

KINIXIS erosa, Dum. et Bibr., tom. II, p. 165.

Description.—The head is long, somewhat depressed; the inferior margin of the upper jaw is slightly incurvated, presenting a sharp cutting edge; the lower jaw is also sharp and cutting, and terminates anteriorly in a slight hook, concealed within the margin of the upper jaw, when the mouth is closed. The upper surface of the head is covered with small scales posteriorly, and larger plates in front; the latter are six in number, viz.: one rostral, two fronto-nasal, two frontal, and one vertical plate; the rostral plate is small and triangular, its apex pointing backwards; the fronto-nasal are of moderate size, irregularly pentagonal, somewhat prolonged posteriorly; their inner margin on a line with the corresponding margins of the frontal plates; the frontal are large and pentagonal, slightly convex above, their anterior and internal margins forming a right angle; the vertical plate is large and angular in front; its lateral and posterior margins are very irregular. Tympanum large; nos-

trils large and wide apart; the eyes are of moderate size, somewhat projecting, and have a mild expression. The neck is of moderate length, and presents a minutely granulated surface.

The anterior extremities are large and compressed, covered with scales and large trihædral tubercles anteriorly, and with scales and granulations posteriorly; the tubercles, which are nine or ten in number, are arranged in longitudinal and somewhat irregular rows; four or five are placed along the superior and anterior margin of each extremity; one of them is much larger than the rest, and terminates in a sharp point; the intermediate row consists of two, sometimes three tubercles, the most inferior of which is the largest; of those situated along the inferior margin, two are remarkably large, corresponding nearly in size with the most inferior of the middle row; besides these, there is a smaller tubercle placed at the internal angle of each elbow. The posterior extremities are of moderate size, slightly compressed, sub-clavate, terminating in four toes, each furnished with a strong, and slightly incurvated nail, the two middle the longest; they are covered with numerous polygonal scales, of nearly equal size anteriorly, larger upon the soles of the feet, upon the posterior surface of the leg, and along the posterior margin of the carpus, where they assume the form of tubercles. Tail rather long and compressed, broad and thick at base, pointed at tip, covered with small scales.

The shell is oblong-ovate, somewhat depressed, broader and gibbous posteriorly; elongated and tecti-

form in front, its free margin strongly denticulated ; the posterior margin of the sternum and carapace more or less eroded from frequent contact ; of the five vertebral plates, the first is pentagonal, broader in front, having its anterior angle pointed ; the second, third, and fourth, are hexagonal ; the fifth is quadrilateral, having its basis rounded, and joined to five of the marginal plates ; in its centre is a marked protuberance, corresponding in situation with the area ; the first costal plate is trapezoidal, elongated and rounded anteriorly, its superior margin, where it joins the second vertebral plate, much the smallest ; the second is pentagonal, sometimes heptagonal, the third is pentagonal, the fourth is trapezoidal ; the marginal plates are twenty-three in number, viz.: eleven on each side, and a supracaudal, which is single ; the first marginal plate is broad and quadrilateral, the second and third are triangular, having their bases rounded, and their apices truncate ; these plates are turned slightly upwards at their outer margins, hence their upper surface appears somewhat concave ; the fourth, fifth, sixth and seventh, are more or less quadrilateral in shape, longer in the vertical than in the antero-posterior direction ; they are each distinctly carinated. The marginal plates which belong to the moveable portion of the carapace, are nine in number ; of these, the first is small and somewhat triangular, the base presenting upward, and the apex, which is obtuse, downward. The remaining plates are irregularly quadrilateral, having their outer margins everted, or turned upward towards the disk ; the supra-caudal is large,

and more extended in the transverse than in the vertical direction. The upper surface of each of these plates is strongly marked with concentric striæ; they each present a granulated area, which, in the vertical plates, is central, but in the costal approximates more or less to their superior margin; those of the remaining plates of the disk are placed along its marginal outline. The vertebral plates are indistinctly carinated. The moveable portion of the carapace comprises that portion of it which is covered by the two last vertebral plates, the last costal pair, and the nine posterior marginal plates; the line of flexion, therefore, passes between the seventh and eighth marginal, the interval between which is filled up with a sort of fibro-cartilaginous substance, the third and fourth costal, and the third and fourth vertebral plates. The sternum is large, emarginate in front, rounded posteriorly; the gular plates are triangular, their apices presenting backwards; the brachial are large and quadrilateral, rounded externally, their anterior margin the smallest; the thoracic are broad and pentagonal, presenting an obtuse angle anteriorly; the abdominal are very large and quadrilateral, being joined externally to two of the marginal plates, and to the anterior and inferior margin of the inguinal plate; the femoral are trapezoidal, their anterior and internal margin forming a right angle, the internal margin is much the smallest; the subcaudal are small and triangular; the axillary plates are small, and almost concealed within the shell; their outer surface is triangular, the apex pointing upward and

backward. The wings are long, extending from the fourth to the seventh marginal plate inclusively. The anterior portion of the sternum is thick and strong, constituting a firm support for the neck of the animal; it projects half an inch beyond the carapace.

Colour.—Head above light straw-colour, with a slight tinge of orange upon the rostral and fronto-nasal plates. Upper jaw light horn-colour anteriorly, with a tinge of orange along its posterior border; lower jaw light orange; iris dark brown; chin flesh colour with a few spots of orange; throat flesh colour; neck very pale straw colour above, flesh colour beneath, becoming deeper when the animal is irritated; anterior extremities light straw colour, lighter upon the humerus, and in the axilla. Posterior extremities and tail of a uniformly light straw colour. Shell deep chestnut-brown, lighter in front upon the anterior vertebral, and the anterior marginal plates; the costal plates are bordered inferiorly with yellow, most perceptible upon the two first. In some specimens the ground colour of the first and second costal is yellow, the chestnut appearing in the form of rays; sternum black, bordered with light yellow; in very old specimens the yellow predominates, the black appearing in the form of large blotches.

Dimensions.

	Inches.	Lines.
Length of head, - - - - -	2	3
Breadth of head, measured from the anterior angle of one orbit to the corresponding angle of the other, - -	0	10
From posterior angle of ditto, - -	0	12
Greatest breadth posteriorly, - -	1	3
Height of head, measured in a line with posterior angle of lower jaw, - -	0	9½
Length of neck, - - - - -	3	0
Length of anterior extremities, - -	5½	0
“ of posterior “ - -	4	10
Length of tail, - - - - -	3	0
Length of carapace, following line of curvature, - - - - -	12	0
Breadth, measured in the middle, and in the same manner, - - - - -	8	10
Length of anterior portion of sternum, - -	3	6½
“ of middle “ - -	4	1
“ of posterior “ - -	1	9
Breadth of anterior portion of sternum, - -	4	3
“ of middle “ - -	7	0
“ of posterior, “ - -	5	2
Height of shell, - - - - -	4	0

The first notice we have of this species is by Shaw, in the third volume of the General Zoology, in which he describes the shell of the young animal, and gives, as a synonyme, the *TESTUDO denticulata*, of Linnæus, which is now ascertained to be the young of the *tabulata*. Schweigger next de-

scribed it in his Prodomus to the Koenigsberg Transactions, under the name of *erosa*, in order to distinguish it from the *denticulata* of Linnæus, which he had ascertained to be a different animal. The next notice we have of it is by Mr. Bell, whose description was drawn up chiefly from the shell of an adult specimen, on which he founded the present genus. He calls it *castanea*, from the chestnut color of the carapace, and considers it a new species. Mr. Gray, in his Synopsis Reptilium, describes it under the name of *KINIXIS erosa*, retaining the generic name of Bell, and the specific appellation of Schweigger. In this he is followed by Dumeril and Bibron, in their Natural History of Reptiles, now in course of publication. But inasmuch as Shaw was the first to describe the animal, although in its young state, it is evident that his name should be retained. The *very strongly* marked denticulations which characterize this species, differing, as it does, in this respect from the others which belong to the genus, make it, moreover, quite appropriate.

Habits and Geographical Distribution.—Not much is known of the habits of this animal in its native haunts; in a state of captivity its movements appeared remarkably sluggish, being seldom found at a great distance from the part of the garden in which it was deposited. He generally selected a shady place alongside the fence or wall, and in the neighborhood of running water, of which he drank at times profusely. His food consisted of fruits and vegetables, chiefly, as apples, pears, Irish and Sweet

potatoes, &c., but he was also fond of meat, both in its cooked and raw state.

The *KINIXIS denticulata* is undoubtedly a native of Africa. Dumeril and Bibron 'give Guadaloupe as its habitat, on the authority of Mr. Gray, but the present specimen, with two shells of the same species was brought in the Saluda, direct from Liberia, whither she had been for the purpose of conveying emigrants. It was sent to Dr. Blanding by the Rev. James Eden, one of the colonists of New Georgia, who states that they inhabit, in great numbers, the shady banks of the St. Paul and Mesurado rivers, and that they die in a short time, if exposed to the rays of the hot sun.

Description of a New Species of FULIGULA.

By GEORGE C. LEIB, M. D.

Read January 7th, 1840.

FULIGULA grisea.

THIS duck was procured in the market of Philadelphia, on the 15th of December, 1839, but no information concerning its history could be obtained, further, than that it was shot in the neighborhood of Great Egg Harbour, New Jersey. The stomach contained small, broken shells.

Specific Characters.—Speculum and throat white; bill expanded and tumid; teeth remarkably developed; plumage dark gray, inclining to fuscous.

Female, uniform grayish-ash.

Description.—Length of bill, above, one inch and seven-tenths; breadth, eight-tenths; length of lower mandible from rictus, two inches and three-tenths; breadth, nine-tenths. Upper mandible black, with a large, pale, livid space at base, including the nostrils, which are soft and patulous, open and oblong; near the tip the edges are spread out and elongated by a membranous appendage, soft and extensible; a slightly curved line or furrow is traced from the sides of the unguis, half-way to the base. Inferior edges of the lower mandible pale flesh color, the tip, and connecting membrane, black; teeth remarkably large and broad. The whole head and cheeks are dark grayish-fuscous; a crescentic band

✂ Since writing the within, I have discovered that this bird is the young of the *labradora*, in a plumage heretofore undescribed or figured ; which circumstance is sufficient to render it interesting to naturalists.

G. C. L.



of cream color beneath, and partly behind the eye; back of the neck, and whole dorsal plumage, light grayish-plumbeous; shafts of the scapulars blackish; rump and upper tail-coverts dark grayish-fuscout; tail three and a quarter inches in length, rounded, dusky, of fourteen feathers; primaries black, first and second longest; secondaries white, forming a speculum upon the wing when closed; this consists of ten feathers, the four first, from the base, for two-thirds of their length, dusky; the five adjoining are of the same color for the like distance on their inner vanes, the tenth has a similar mark as far as the tip. Irids light brown. Chin and throat white. Whole lower parts uniform dark grayish-fuscout; axillaries and internal wing-coverts grayish-white; an indistinct pectoral band of whitish, varied with rufous; legs and feet dusky, webs darker; length of tarsus one inch and eight-tenths; middle toe, two and a half inches; hind toe, six-tenths. The labarynth in the trachea of the male large.

The *female* is of an uniformly lighter color, approaching to ash, and wants the pectoral band and white throat, but in other respects resembles the male.



Fig. 3

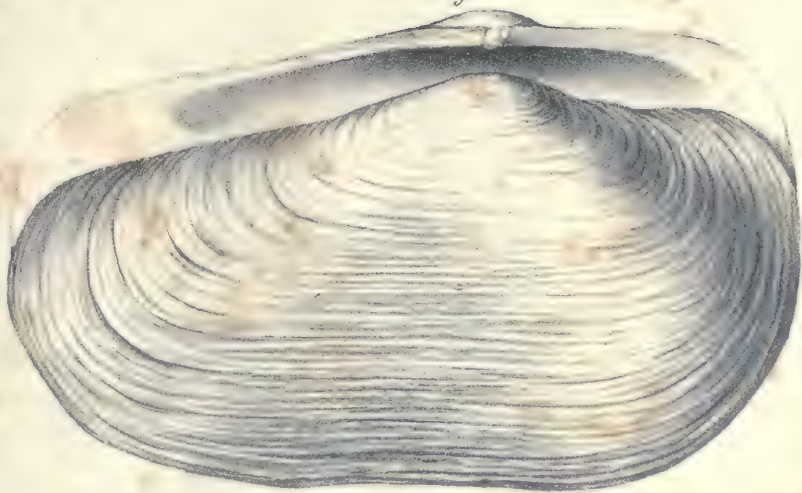


Fig 2



Fig 4

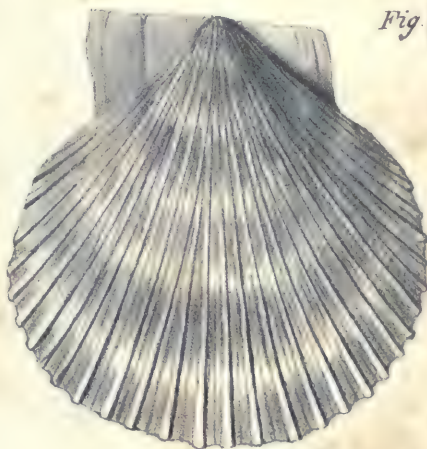
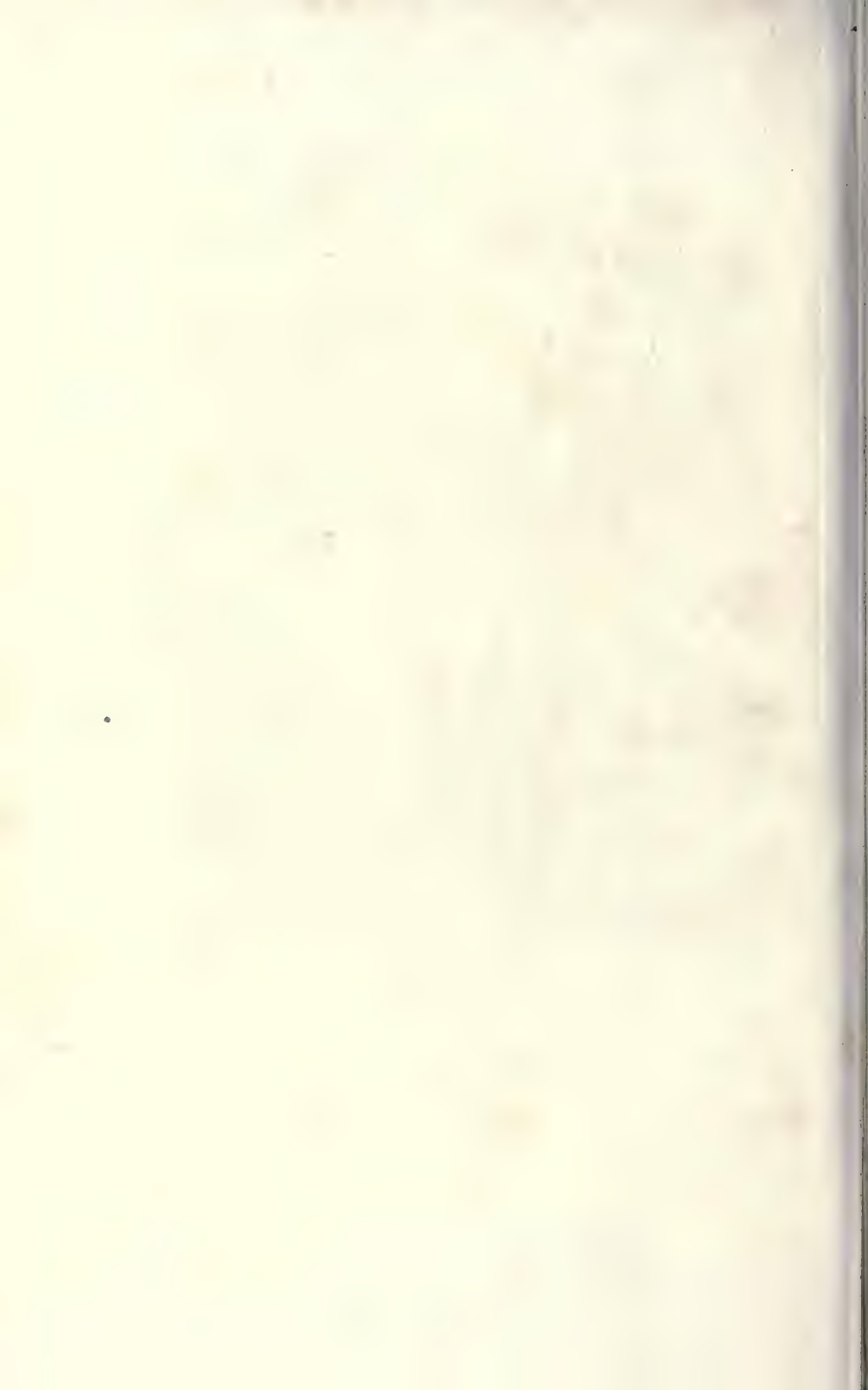


Fig 5



Fig 4







Lepus Townsendii.





Libinia Mortalini.

Libinia Mortalini.

Libinia Mortalini. Mortalini & Co. New York, N. Y. 1877.

Libinia Mortalini. Mortalini & Co. New York, N. Y. 1877.





On Stone Engraved by J. Astermann.

Thalassina pulchra.

McMurtrei Des.

Printed by J. S. I.

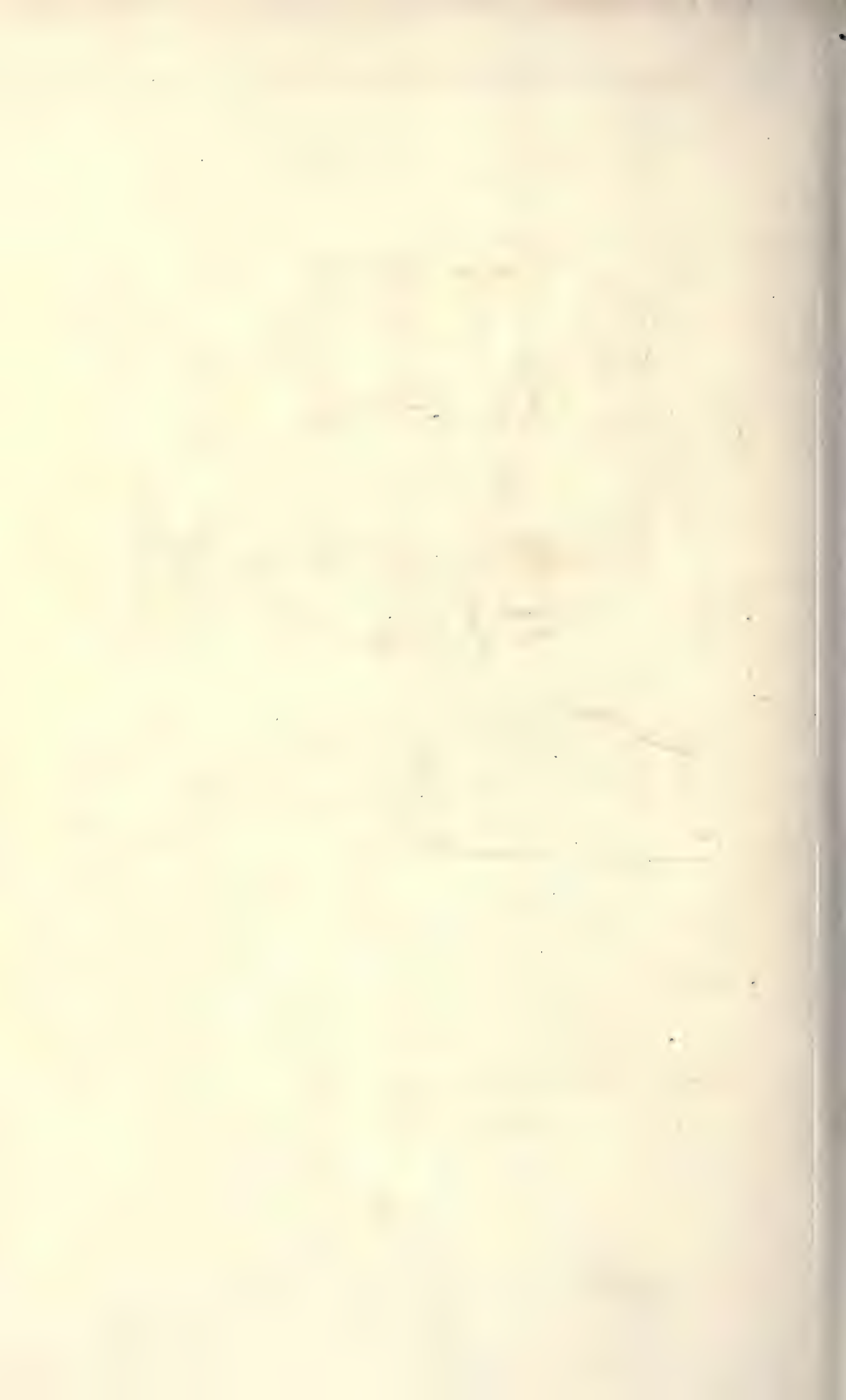




Fig. 1.

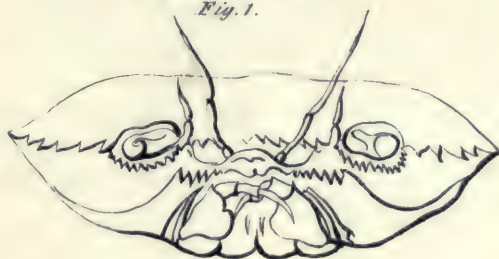


Fig. 2.



Fig. 4.



Fig. 5.

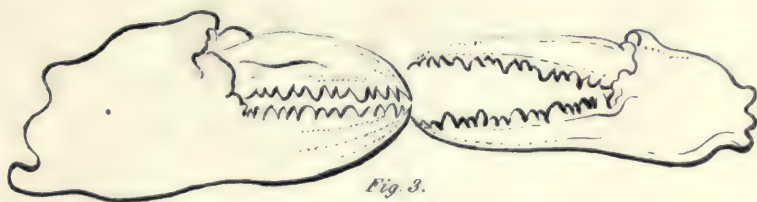


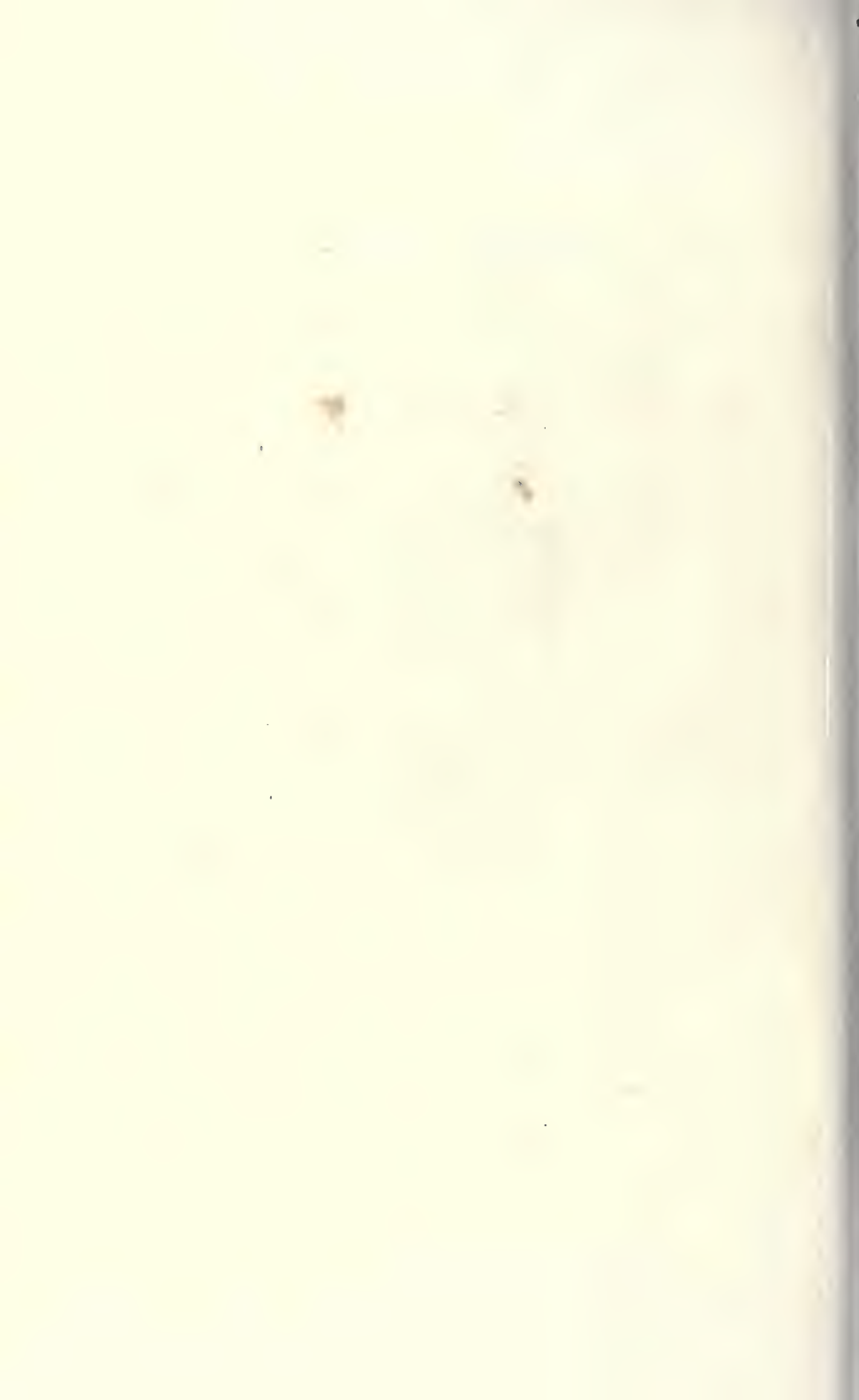
Fig. 3.

REFERENCE.

Figs. 1, 2 & 3. - Details of *Orthostoma dentata*.

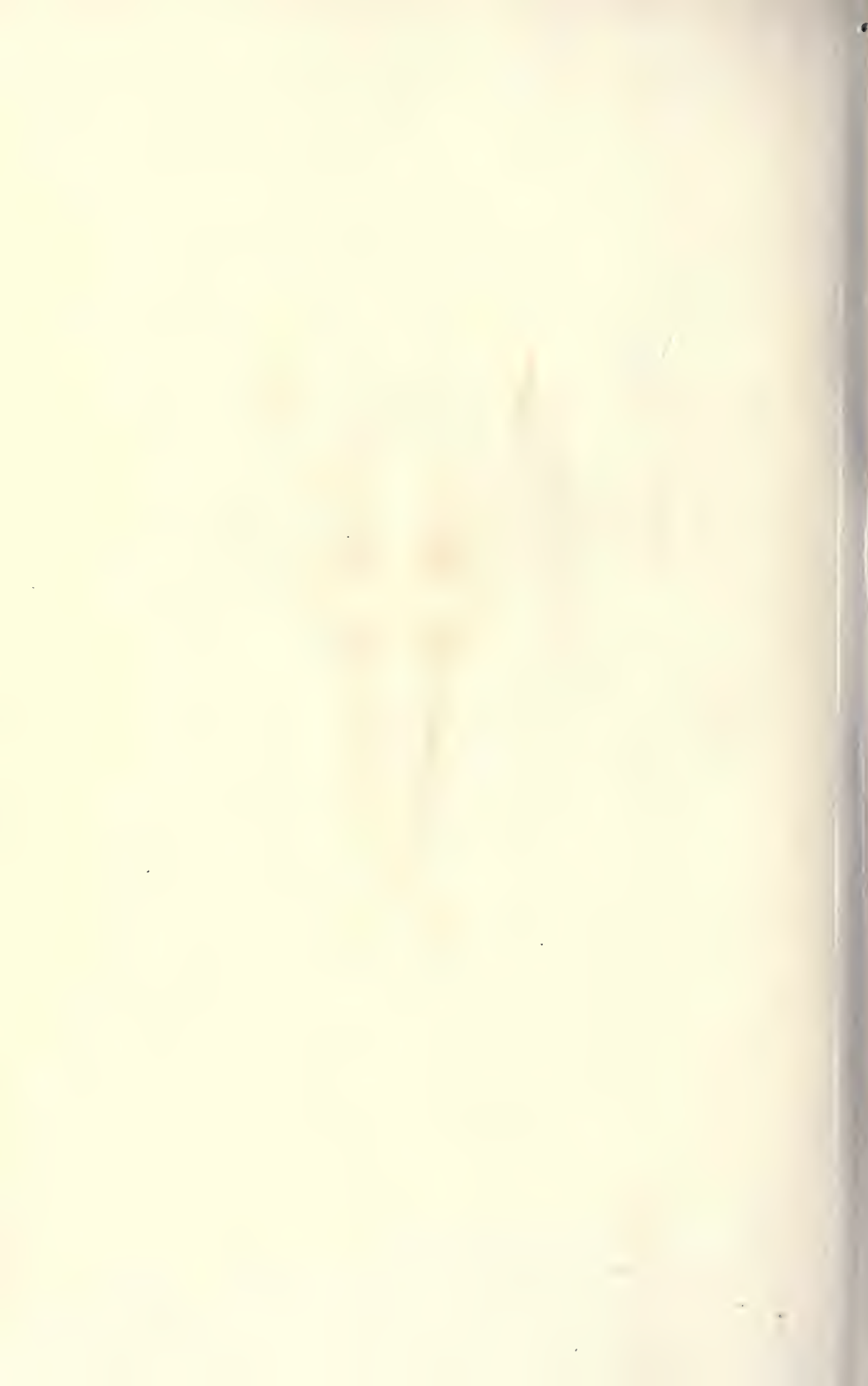
Fig. 4. The outer Maxillary feet of *Pachygrapsus*.

Fig. 5, Third foot of *Styoida bisulcata*.





Blepharipoda Occidentalis





M^o Murtrie, Des

Astacus Oreganus.





KINIXIS DENTICULATA.

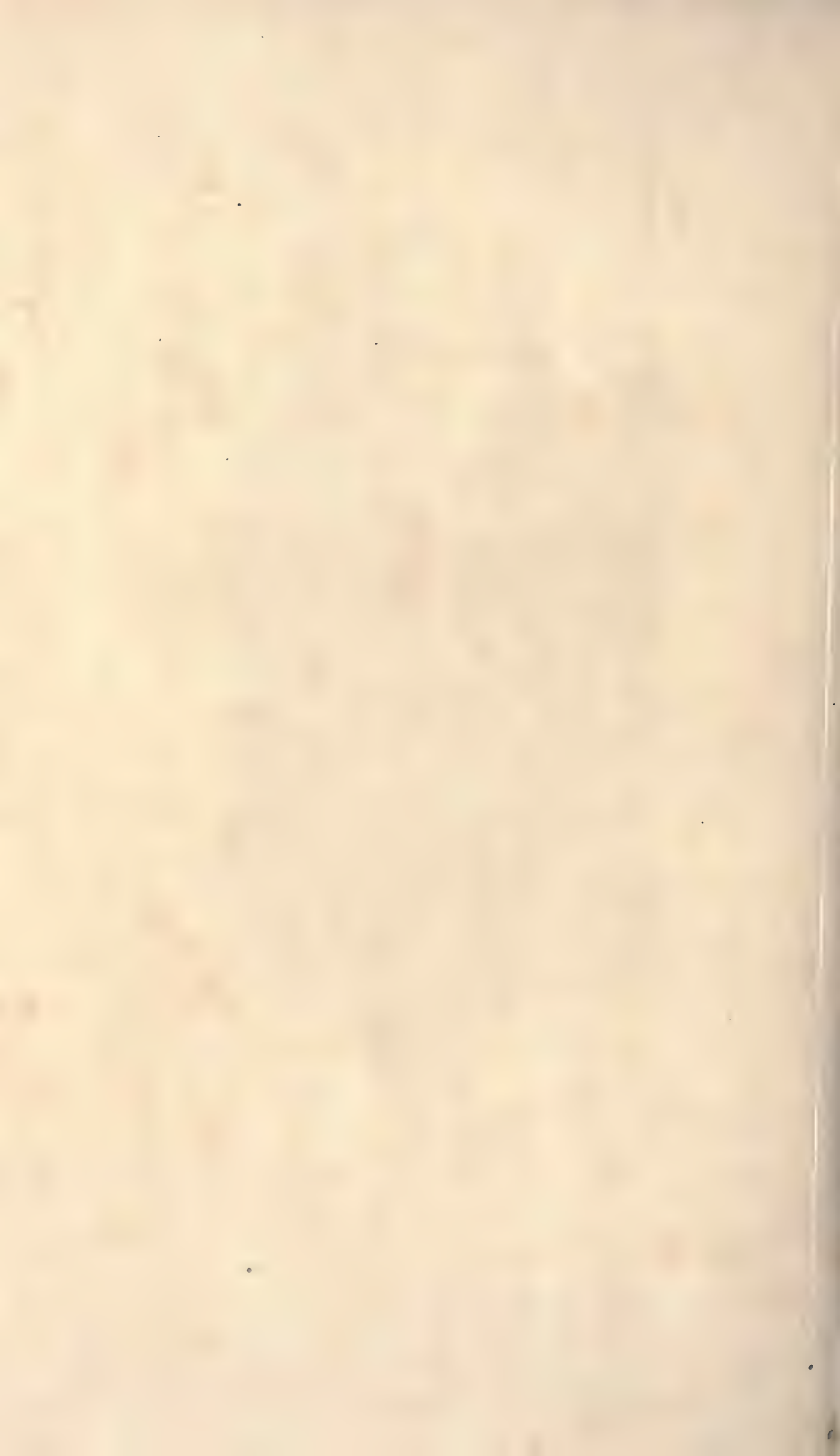
From Nature on stone by J.K. Richardson

Fig. 8. Dorsal, with Pencil





KINIXIS DENTICULATA.





JOURNAL
OF
THE ACADEMY OF NATURAL SCIENCES
OF
PHILADELPHIA.

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**VOLUME VIII. PART II.**  
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Some observations on the Mechanical Structure of Coal, with evidences of the contemporaneous origin of its various kinds. By WALTER R. JOHNSON, A. M.

Read April 13, 1841.

THE question of the identity and contemporaneousness of the two great divisions of the coal measures of Pennsylvania, has sometimes occupied the attention of geologists. A similar question is occasionally agitated in Europe, in reference to the Anthracite and Bituminous coal fields of that quarter of the world.

Among the arguments in favor of the contemporaneous deposition of the coal in the two regions, those which are derived from the similarity of the

accompanying measures or members of the coal series in the two regions, and the resemblance or identity of the fossil organic remains accompanying the coal in both cases, are not the least weighty.—The presence of large bodies of carbonate of iron interposed among the coal beds in both coal districts, is an analogous circumstance strongly corroborative of the opinion that both varieties of coal were produced under circumstances at least strongly resembling each other.

Another fact, favorable to the supposed similarity of circumstances which accompanied the deposition of anthracite and bituminous coal, is the resemblance in mechanical structure of the two kinds. This may, at the first enunciation, seem somewhat startling; especially since the terms heavy, hard and tough, are generally applied to the one, and light, soft and friable or tender, to the other. It is nevertheless true, that strong mechanical resemblances exist; and the more minutely we examine the two varieties, the more shall we be impressed with the conviction of the importance of the resemblance.

In the first place, the coal of all coal measures has a series of partings parallel to the floor or bottom of the bed on which it rests, and to the cover or roofing under which it lies. These are as distinct in inclined and vertical beds as in those which still remain horizontal.

In the second place, the connection between the coal and its underlying slate, as well as with its top slate, is so definite and well understood, that it

serves to determine the true original position of coal beds, which have been so far disturbed as to be turned nearly upside down; of which examples are not wanting. These characteristics are found in beds of both kinds of coal.

In the third place, there is most commonly a fracture or division of the coal in some direction (which, for the same bed, is generally continuous,) and nearly at right angles to the planes of deposition.

Fourth, a third series of divisions by vertical planes, called cross partings, inclined to the last mentioned. This system of planes is not always continuous throughout the bed, but varies in the different plies.

The principal vertical divisions are known to miners by the names of "cleats" or "slines," and sometimes by that of "grains." The direction in which these run, seems to determine the manner of working out the coal; for in attempting to separate large masses from their natural position by means of wedges, it is only in the direction of the cleats that the separation can take place. In inclined beds, from which the coal is to be extracted by a *slope* or rail-road laid down on the floor of the bed, it is a great convenience to have the cleat lie in a direction diametrically across that of the slope, or in conformity with the *strike* of the bed; for then in running a drift from the bottom of the slope horizontally along the bed, and afterwards carrying the workings upward, the cleat will always face the miner, and he will be enabled to obtain heavy falls of coal by undermining and wedging down.

In most bituminous coals, and in not a few anthracites, the "cleavage of the laminæ," or what I have chosen to call surfaces of deposition, are sufficiently distinct, and afford ready partings to separate masses into small pieces. In some of the harder anthracites, however, these surfaces are nearly obliterated, being distinguishable only by different shades of black. The actual cleavages of the coal, in such instances, seldom take place along the surface of deposition; but on igniting the specimen, we may generally obtain partings in those natural seams. I exhibit an example in coal of Hazleton.

The regular slines also, in anthracite, are sometimes so far obliterated as to be only developed by strong heat or partial combustion. They are then shown by the thin, white shining laminæ of earthy matter, which mark two opposite sides of a lump of half burnt coal.

The absolute direction of the cleat is very various. At the Laurel Hill mines, in Hazle creek valley, it is believed to be about North 80° East.

In some beds of coal which I discovered and examined on the West Branch of the Susquehanna, it is due east and west by compass.

In the Middleton mine coal, in the northerly part of England, it is from North 20° West to North 32° West.

The second, or "short cleat," in opposition to the "long cleat," which extends for great distances, is the cross parting already spoken of, and not unfrequently runs perpendicularly to the directions of both the "cleavage of the laminæ and to the long

cleat." This is seen in both bituminous coals and anthracites.

Another circumstance to which I would refer, as indicative of the similarity of origin and correspondence in character, between bituminous coals and anthracites, is the correspondence of the two, in respect to the composition of the ashes of the two kinds. Silica, alumina, oxide of iron, with small amounts of lime, magnesia, and occasionally of oxide of manganese, are the ingredients of the ashes of both the kinds of coal. The proportions vary, not only in the different kinds of coal, but also in the several plies of the same bed, both in the bituminous and anthracite districts. In the anthracite, the diversity of composition is marked by the color of the different streaks after partial incineration.

Another resemblance between the two kinds is, that in the anthracite beds, spaces partially vacant are found to contain masses, with a puffy aspect on the exterior, so strongly resembling coke, that it might be difficult at the first glance to distinguish a fragment of it from a piece of artificial coke. Natural coke is also found in connection with beds of bituminous coal, especially where the latter are in close proximity with primitive strata—as in the mines of Virginia.

When coal contains a large proportion of earthy matter, and is deposited in thin laminæ, it will, in the state of anthracite, be found to part with great difficulty in the direction of the surfaces of deposition. It will then be seen to give fractures, developing a multitude of small conchoidal surfaces. This

is by miners termed bony coal ; and that it well deserves its name may be evinced by its actually being so hard as sometimes to strike fire with steel.

Coal occasionally assumes the appearance of well defined rhombic prisms and octahedra, occasionally with striated surfaces, in which cases, though the cleavages be difficult and obscure, they are nevertheless practicable.

Description of three new species of Unio from the rivers of the United States. By T. A. CONRAD.

Read May 11, 1841.

1. *UNIO perplicatus*.—Obtusely subovate, very ventricose ; rather thick, with about 12 oblique, profound plicæ, those behind the umbo recurved ; ligament margin greatly elevated ; posterior superior margin slightly concave, oblique, extremity truncated ; epidermis blackish brown, apex eroded ; within tinged with purple ; cardinal teeth direct, prominent, sulcated. (Length 2.4 ; height 1.3 ; diameter 1.9.)

This species is most nearly related to *U. costatus*, (Raf.) but differs in being far more ventricose, and has very prominent umbones, which are just the

reverse in the costatus. The diameter through the umbonial slope is profound.

2. *U. nodiferus*.—Obtusely subovate, ventricose, moderately thick; surface with a few nodules about the middle of the valves, and smaller ones near the ligament margin; a slight, not very wide, furrow extends from beak to base; posterior margin approaching to a regular curve; beaks eroded; within, white; cardinal teeth robust, prominent, direct, and profoundly sulcated in old shells; epidermis chestnut brown. (Length 2.1, 1.8; height 1.1, 1; diameter 1.6, 1.4.)

Approaches *U. prasinus*, but differs in being proportionally longer, more convex, in having a brown epidermis, narrower anterior side, and oblique posterior margin.

3. *U. parallellus*.—Oblong, sub-rhomboidal, convex, moderately thick, slightly contracted from beak to base; hinge and basal margins parallel, nearly rectilinear; posterior margin oblique; extremity obtusely rounded; epidermis dark olive brown; within white; cardinal teeth oblique, double in each valve; cardinal area under the beaks almost obliterated. (Length 3.7; height 1.1; diameter 1.8.)

Some conchologists may consider this to be a variety of *U. purpureus*, (Say,) and as but one specimen has been received, I cannot judge of the amount of difference which will obtain between the two species. I think the *purpureus* has never yet been found nearly so far south-west as Louisiana; certainly after a long examination of the waters of

Alabama, I was unable to find it. The *parallelus* differs from *purpureus* in having a white interior, in the obliteration of the cardinal area, in the regular convexity of the valves, and in having a much larger accessory muscular impression.

These three species are in the collection of the Academy: they were sent from Jackson, in Louisiana.

Examination and Analysis of Coal found in the Province of Arauco, coast of Chili, thirty miles south of Bio Bio river. By WALTER R. JOHNSON, A. M.

Read May 18, 1841.

The sample of coal, of which the following is a description, was collected by Mr. J. F. Watson, of this city.

In exterior appearance it is nearly related to many of the richest bituminous coals of this country and of Europe.

It is moderately compact; thin shining laminæ are seen parallel to the bed or plane of superposition, but the greater part of the mass is of a dull or pitchy black color.

Its horizontal or depository surfaces are rather uneven; vertical sections in some parts smooth, in

others, irregular; very little indication of reediness is perceived. Portions of "clod" or vegetable charcoal are occasionally met with.

Its specific gravity is 1.324.

At a temperature of 300° Fah. it loses of water	2.2	per ct.
Coked at a bright red heat it gives off of volatile matter, burning with a brilliant flame	27.8	"
It contains of carbon, not volatile by simple heat	67.62	"
And when fully incinerated leaves of reddish gray ashes	2.38	"
	<hr/>	
	100.	

On being quickly exposed to a full red heat it becomes completely fused, and the original form and structure are entirely lost. The coke accordingly belongs to that class which has received the designation of "highly bituminous coal coke."

	<i>Carbon.</i>	<i>Vol. matter.</i>	<i>Ashes.</i>
In composition this coal bears a strong analogy to the Staffordshire Wednesbury coal, which gives (Berthier)	67.5	30.	2.5
Clyde, near Glasgow, (also examined by Berthier)	64.4	31.0	4.6
Karthaüs, (analysed by W. R. Johnson)	68.1	28.8	5.1
Varteg, 'three-quarter coal,' (Mushet)	67.9	29.6	2.5
Blandare Meadow Coal, used at Pont-y-Pool, (Mushet)	66.84	29.16	3.0
Risca Big Vein, South Wales (Mushet)	68.016	29.15	2.834
Phelps vein, at Mynyddyswyn do.	68.00	30.00	2.00
Dee Bank, near Holywell do.	66.348	31.60	2.054
Porkgate, main coal, Yorkshire, do.	67.145	30.730	2.125
Northumberland, Tyne Works, (Berthier)	67.500	30.00	2.50

	Carbon. Vol. matter. Ashes.		
Kidsgrove, North Staffordshire, seven feet coal (Mushet)	67.905	30.47	1.625
Green hole shaft, James' river, Va. (Geolog. Survey)	67.83	30.17	2.00

*Description of a new American species of the genus
Helix.* By JOHN S. PHILLIPS.

Read June 1, 1841.

HELIX *lasmodon*. Testa subelevata, lenticulata, crassiuscula, umbilicata, substriata, apertura compressa; labro acuto, uno vel duobus dentibus lamellosis; base rotundato; colore albo corneo.

Shell moderately elevated, lenticular; rather thick; epidermis pale whitish horn color, smooth, shining; whirls eight, very faintly and obliquely striated; suture indistinct; aperture compressed, within a broad calcareous deposit, and one or two lamellar teeth following the direction of the whirls; lip acute; umbilicus moderately large, rounded and deep; base regularly rounded into the umbilicus. Transverse diameter seven-twentieths, height three-twentieths of an inch. Brought from Alabama by Dr. W. Blanding.

This shell resembles no other American species but *H. suppressa*, Say, and *H. gularis*, Say, and from these it differs decidedly in the well defined and

deep umbilicus; it differs from H. *Epistilium*, in the smaller size, greater number of whorls, large umbilicus and lenticular form.

Description of twenty-four new species of Fossil shells, chiefly from the Tertiary deposits of Calvert Cliffs, Maryland. By T. A. CONRAD.

Read June 1, 1841.

VENUS.

VENUS latilirata.—Trigonal, convex depressed; ribs concentric, about 5 or 6 in number, flattened, reflected, irregular, one of them generally very wide; ribs irregularly sulcated on the posterior slope; inner margin finely crenulated. Smaller than *V. alveata*, and with broader, less prominent ribs, which do not diminish in size on the posterior margin.

CYTHEREA.

CYTHEREA subnasuta.—Trigonal, thin, ventricose; anterior side narrowed, slightly produced and subangulated at the extremity; surface with rather prominent concentric wrinkles; posterior margin obliquely arched; beaks distant from anterior extremity, and not nearly central; length $1\frac{1}{2}$ of an inch. Allied to *C. Sayana*, but is proportionally longer,

less ventricose, narrower, and more produced anteriorly.

LUCINA.

LUCINA Foremani.—Orbicular, ventricose, moderately thick; surface with irregular shallow grooves, and rather distant prominent striæ, with intermediate fine, concentric lines; posterior margin subtruncated obliquely outwards; beaks prominent, not central; hinge edentulous. Length $1\frac{1}{2}$ inches. Named in honor of a zealous scientific young gentleman of Baltimore, Dr. E. Foreman.

L. subplanata.—Lentiform, convex depressed, with prominent acute equal concentric striæ; beaks central; cardinal teeth prominent. Length three-fourths of an inch. Very rare.

CARDIUM.

CARDIUM leptopleura.—Subtrigonal, ventricose; ribs about 31, prominent, distant, angular, carinated; umbo prominent, oblique; lateral teeth very prominent; inner margin widely and deeply crenate. Length $2\frac{1}{4}$ inches. Height 2 inches.

ASTARTE.

ASTARTE varians.—Trigonal, compressed; posterior side cuneiform, extremity acutely rounded; umbo flattened, sulcated. Length $1\frac{1}{4}$ inch.

Var. A. Proportionally shorter, more convex, with numerous concentric furrows.

Allied to *A. perplana*, but has a much deeper lu-

nule, more oblique teeth, and it is also narrower, and more produced posteriorly.

A. exaltata.—Obovate acute, convex; umbo sulcated; apex very prominent; lunule elongated and profound. Height and length equal, five-eighths of an inch.

LIMA.

LIMA papyria.—Obliquely obovate, thin and fragile, inflated; with prominent radiating lines, distant towards the anterior margin; anterior margin angulated at base of the ear, truncated or slightly concave below, and abruptly rounded where it joins the basal margin; ears small. Height seven-eighths of an inch; length three-fourths of an inch.

ARCA.

ARCA subrostrata.—Ovate; profoundly ventricose; ribs about 30, little prominent, flat, longitudinally sulcated; posterior side produced, cuneiform; rounded at the extremity; hinge linear in the middle; teeth obsolete, except towards the extremities; within slightly sulcated; crenulations of the margin sulcated in the middle. Length 2 inches.

PLEUROTOMA.

PLEUROTOMA Marylandica.—Fusiform, with spiral wrinkled lines; upper half of whirls of the spire concave, the lower convex, and with oblique ribs. Length $2\frac{1}{2}$ inches.

P. bellacrenata.—Fusiform; whirls much contracted below the middle, with obsolete spiral lines,

and crenate above the suture and on the shoulder of body whirl; body whirl with five or six strong spiral striæ, and an intermediate fine line; back finely striated. Length $1\frac{1}{4}$ inch.

TROCHUS.

TROCHUS peralveatus.—Volutions 5 or 6, with each a deep groove near the base; space below the suture profoundly and widely channelled; upper margin of whirls acutely carinated; base with 5 profound grooves. Length $1\frac{3}{8}$ inch.

SCALARIA.

SCALARIA pachypleura.—Turritid; short in proportion to its width; volutions 6 or 7, rapidly diminishing in size; ribs very thick, prominent, reflected, terminating above in prominent angles. Length five-eighths of an inch.

SOLARIUM.

SOLARIUM trilineatum.—Depressed, conical; whirls with obsolete spiral lines, and transverse striæ, an impressed line below the suture; whirls carinated at base; suture deeply impressed; periphery carinated, and margined above and beneath by a carinated line; umbilicus profound, crenate on the margin, and with a submarginal impressed line, striæ radiating from the umbilicus, becoming obsolete towards the periphery. Width $\frac{1}{2}$ inch.

INFUNDIBULUM.

INFUNDIBULUM perarmatum.—Trochiform; whirls

convex, armed with numerous erect foliated spines. Width $1\frac{1}{2}$ inch.

Allied to *I. trochiformis*, Lam. but is less variable in form, and has larger spines.

FISSURELLA.

FISSURELLA Marylandica.—Elevated, with numerous striæ, alternated in size and minutely granulated by fine crowded concentric lines crossing them; foramen large, regularly oval. Length 1 inch.

Closely allied to *F. Griscomi*, but is readily distinguished by a much larger foramen, finer concentric lines, in not being laterally compressed, &c.

DISPOTÆA.

DISPOTÆA ramosa.—Suborbicular, with broad prominent ribs, and radiating, ramose, wrinkled and highly ornamental striæ; margin profoundly indented by the projecting ribs. Width $1\frac{3}{8}$ inch.

This species has been confounded with *D. costata*, but the ramose lines give it a very distinctive character. Occurs on James River, Virginia.

CANCELLARIA.

CANCELLARIA biplicifera.—Turritid, with thick longitudinal ribs, and spiral rather distant impressed lines; on the body whirl an occasional fine line; space below the suture widely and deeply channelled; shoulder coronated; umbilicus small; columella concave, and with two plaits. Length $1\frac{1}{2}$ inch.

C. engonata.—Short fusiform, with strong spiral prominent lines and numerous longitudinal costæ, not so distinct as the transverse lines; spire scalariform, volutions, 4; columella with 3 plaits, the middle one very oblique; submargin of labium with prominent transverse lines. Length three-eighths of an inch.

BONELLIA.

BONELLIA lineata.—Subulate, polished, with obsolete spiral lines, distinctly visible only on the body whirl; a spiral line margins the suture at base of each volution, causing the suture to appear profound; this line is continued on the middle of the body whirl.

Very distinct from *B. terebellata*:* the deeply impressed suture and smaller umbilicus distinguish it at a glance.

TURRITELLA.

TURRITELLA indenta.—Subulate, whirls about 15, contracted or indented above the middle, and with obsolete spiral striæ; suture profound, the lower margin obtusely carinated by the indentation; the upper margin also subcarinated; basal margin acutely angulated; base flat or slightly concave. Length 2 inches.

T. exaltata.—Subulate, profoundly elongated; whirls convex, with spiral striæ; base of each with a slight groove, and carinated line which margins the suture; waved longitudinal rugæ robust.

* *BULIMUS terebellatus*, Lam.

Obtained only in fragments, but the spire tapers so gradually, that the shell must have attained between 3 and 4 inches in length by half inch in breadth.

T. perlaqueata.—Subulate; whirls convex at base, longitudinally ribbed or fluted, with very fine spiral striæ, most profound towards the base of the large volution. Length rather more than half an inch.

MARGINELLA.

MARGINELLA perexigua.—Very small, obtusely ovate; labrum profoundly thickened, the margin minutely crenulated; labium with 4 plaits; spire depressed; volutions concealed.

A small species, very much like a *Cypræa* in form. Length one-eighth of an inch.

Polyparia.

ASTREA.

ASTREA Marylandica.—Incrusting, very thin; cells unequal, sub-pentagonal; margin acute and prominent; radiating lamellæ distant, about 12 in number.

Frequently incrusting the *PECTEN Madisonius* on James river, Virginia.

A. bella.—Incrusting, thick; cells unequal, pentagonal; rays numerous, minutely and beautifully denticulated; frequently alternated in length.

Occurs near Newbern, N. C.

Lower Tertiary Fossils.

CARDIUM.

CARDIUM *Nicolletti*.—Cordate, ventricose, polished, with crowded, minute, impressed, radiating lines; beaks central; summits very prominent; posterior margin nearly direct, slightly emarginate; posterior slope with larger striæ than the disk, and muricated with radiating rows of approximate, rather obtuse, slender and prominent tubercles. Length $2\frac{1}{2}$ inches. Height the same.

For this splendid Cardium I am indebted to my distinguished friend Mr. J. N. Nicollet. It was found in green clay, at 50 feet in height, on the right bank of the Washita river, Monroe county, Louisiana.

FUSUS.

FUSUS *pachyleurus*.—Fusiform, thick, with spiral striæ not very distinct; whirls of the spire concave above, convex, and with obtuse ribs below, except upon the lower whirl which is entire; body whirl also destitute of ribs, abruptly rounded or subangulated at base, ventricose; beak long, thick, straight; labium widely reflected; channel contracted. Length $2\frac{1}{4}$ inches.

Presented by Mr. Nicollet. It is from the Lower Tertiary of Alabama.

Some Remarks on the Ancient Peruvians. By SAMUEL GEORGE MORTON, M. D.

Read June 1, 1841.

IN my work on American skulls (*Crania Americana*,) I have expressed the opinion that the heads of the ancient Peruvians were *naturally* very much elongated; and that they differed in this respect from those of the Inca Peruvians, and other surrounding nations; and having given this opinion at a meeting of the Academy prior to the publication of my work, I take the present occasion to renounce it.

In the American Journal of Science, for March, 1840, I have already, in a brief note, adverted to this change of opinion; and I now repeat my matured conclusions in connection with positive facts, derived from the work of a distinguished traveller and naturalist, M. Alcide D'Orbigny.

This gentleman not only visited the elevated tableland of the Andes, which was once inhabited by the ancient Peruvians, but he remained a long time in that interesting region, and has collected numerous facts in relation to the people themselves.

1. The descendants of the ancient Peruvians yet inhabit the land of their ancestors, and bear the name of Aymaras, which was probably their primitive designation.

2. The modern Aymaras resemble the surrounding Quichua or Peruvian nations in color, figure, features, expression, shape of the head, (which they have ceased to mould into artificial forms,) and in fact in every thing that relates to physical conformation and social customs: their languages differ, but even here there is a resemblance which proves a common origin.

3. On examining the tombs of the ancient Aymaras, in the environs of the lake Titicaca, M. D'Orbigny remarked that those which contained the compressed and elongated skulls, contained also a greater number that were not flattened; whence he infers that the deformity was not natural, or characteristic of the nation, but the result of mechanical compression.

4. It was also remarked that those skulls which were flattened were uniformly those of men, while the heads of the women always retained the natural shape,—the squared or spheroidal form which is characteristic of the American race, and especially of the Peruvians.

5. The most elongated heads were found in the largest and finest tombs; showing that the deformity was a mark of distinction among these people.

6. The researches of M. D'Orbigny confirm the statements made at distant intervals of time by Pedro de Cieza, Garcilaso de la Vega and Mr. Pentland, and prove conclusively, what I have never doubted, that these people were the architects of their own tombs and temples; and not, as some

suppose, intruders who had usurped the civilization, and appropriated the ingenuity of an antecedent and more intellectual race.

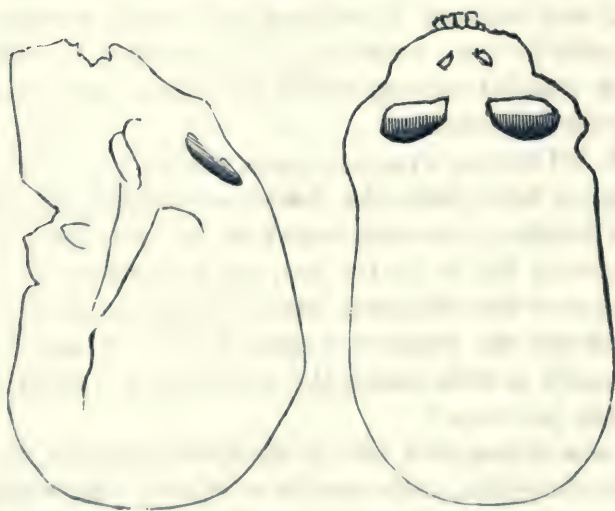
M. D'Orbigny found temples from 100 to 200 metres in length, facing the east, and ornamented with rows of angular columns; enormous gateways made of a single mass of rock, and covered with bas reliefs; colossal statues of basalt; and large square tombs, wholly above ground, and in such numbers that they are compared to towns and villages.

My published observations go to show that the internal capacity of the cranium, as indicative of the size of the brain, is nearly the same in the ancient and modern Peruvians, viz., about seventy-six cubic inches—a smallness of size which is without a parallel among existing nations, excepting only the Hindoos.

M. D'Orbigny even supposes the ancient Peruvians to have been the lineal progenitors of the Inca family; a question which is not yet decided. Supposing this to be the fact, we may inquire how it happens that the Incas should have so entirely abandoned the practice of distorting the cranium; especially as this, among the Aymaras, was an aristocratic privilege?

I was at first at a loss to imagine how this singular elongation of the head was effected; for when pressure is applied to a spheroidal head, as in the instance of the Chenouks and other tribes of the Columbia river, the skull expands *laterally* in proportion as it is depressed above; whereas, in these

people, the head is narrow from the face to the occiput. It seems probable that this conformation was produced by placing splints or compresses on each side of the head from the cheek bones to the parietal protuberances, and another on the forehead, and confining them by rotary bandages. In this way the face, in the process of growth, would be protruded in front, and the head elongated backwards; while the skull, in all other directions, could expand comparatively little. These remarks will be more readily understood by reference to the annexed outlines, which are taken from a cast of one of the skulls obtained by Mr. Pentland.



Dr. Goddard has suggested to me that the deformity observable in this series of crania, might have been produced by the action of rotary bandages

alone, without the use of splints or compresses. I admit the possibility of this result in some of the heads, but think that in others there is satisfactory evidence of the use of the splint or compress, especially on the os frontis.

I have in my possession six casts of heads and three skulls of these people, all of which present the peculiarly elongated form in question.

On the relation between the coal of South Wales and that of some Pennsylvania Anthracites. By W. R. JOHNSON, A. M.

Read June 15, 1841.

HAVING received some time since a number of samples of the coals used by Mr. Crane at the Yniscedwyn iron works in South Wales, some pains have been taken to trace the relation of that mineral to some of the many varieties of anthracite found in Pennsylvania. It was the first step in this inquiry to mark the relation by external characters. These in the Welsh coal are, 1st. A structure often lamellated, and tending to separate on the surfaces of deposition, owing to the quantity of carbonaceous clod which occupies the dull seams between the bright plies of coal.

2d. The abundance and width of the reeds constituting the charcoal deposits.

3d. The shining and polished surfaces occasionally presenting themselves to view, at some of the natural partings.

4th. The purplish tints of metallic oxide often observable on the surfaces of fracture.

5th. The general color is deep black, and either dull or shining, according as the ply which is examined belongs to the coal proper, or to the carbonaceous clod partings of the seams.

The next circumstance worthy of attention in tracing the relation of coals, is their specific gravity; and this in the Welsh anthracite is from 1.336 to 1.372, not greater than that of many bituminous coals.

The next fact to be observed, is the quantity of volatile matter, and this, by the mean of two trials, is 9.18 per cent.; that of the anthracite containing most clod is 10.7, and that of the more compact variety is 7.66 per cent.

Mr. Mushet makes it from 6.66 to 7.80 in the coals of the same locality. Mr. Frazer analyzed a sample of the same coal, and found 7.60 of volatile matter, 86.6 of carbon, and 5.08 of ashes.

The quantity of earthy matter in the Ynisedwyn anthracite, according to the mean of three analyses of Mr. Mushet, is 3.578 per cent. Adopting this for the proportion in the sample which yielded 10.7 per cent. of volatile matter, we have the solid carbon = 85.722 per cent. and in the other 88.762.

Among the Pennsylvania anthracites, that which

according to my observations, approximates most nearly to the Ynisedwyn coal, is that of Lyken's valley, situated in the north western fork of the southern coal field. This coal has all the exterior characters of the Welsh anthracite; containing in many samples a large portion of carbonaceous clod, with well marked vegetable impressions; and in color, structure, and varieties of surface, the two coals might readily be taken the one for the other. Of nine samples analyzed, the lowest specific gravity was found to be 1.374, the highest 1.416, and the mean 1.390. The mean amount of volatile matter, was found to be 8.066, the highest being 11.854 per cent.; the mean proportion of earthy matter and metallic oxides is 4.572; and that of the fixed carbon 87.360 per cent.

From these data we derive the following comparisons:

	<i>Sp. Gr.</i>	<i>Vol. mat.</i>	<i>Carbon.</i>	<i>Ashes.</i>
Ynisedwyn, lighter variety,	1.336	10.7	85.722	3.578
Do. heavier,	1.372	7.66	88.762	3.578
<hr/>				
Mean of two, . =	1.354	9.18	87.242	3.578
Lyken's valley, .	1.390	8.066	87.360	4.572

In distilling the Welsh anthracite, the first portion of gas which comes over, burns with a pale blue flame, like that of carbonic oxide, which is succeeded at a certain point of temperature by a sudden outburst of carburetted hydrogen, burning with a bright flame and some smoke, a quantity of

bituminous matter being at the same time evolved; sufficient in one instance to close up the narrow beak of the retort employed in the distillation. Tho coke is perfectly anthracitous, and the angles of the fragments entirely sharp and well defined.

The gaseous matter of the Lyken's valley anthracite also burns with a brilliant flame, but no violent explosive developement of it was remarked.

Tabular view of the Analyses of nine samples of Anthracite from the mines of Lykens' Valley.

<i>No. of the sample.</i>	<i>Specific gravity.</i>	<i>Water expelled at 320°.</i>	<i>Volatile matter lost at redness.</i>	<i>Fixed Carbon.</i>	<i>Earthy residue.</i>	<i>Exterior and other characters of coal.</i>	<i>Character of ashes.</i>
1	1.391	1.450	6.140	87.950	4.450	Deep black—fracture irregular, shining—or dull from intermixture of charcoal—of which the structure is distinctly seen—and which is soft—sectile—and easily combustible—gives out gas, but does not change form on being ignited.	Color deep brown—inclining to reddish brown—light—little coherent, moderately gritty.
2	1.404	1.390	4.56	89.3	4.750	Brownish black—iridescent or steel blue—surface shining and striated—woody structure of the mineral charcoal seen as above—gas burns brightly.	Light fawn colour, moderately gritty—light—slightly coherent.
3	1.416	0.70	9.30	85.700	4.300	Lustre silky on a carbonaceous ground—mixture of mineral charcoal in certain parts, with a coke-like mass.	Brownish buff—slightly coherent.
4	1.374	1.10	3.50	88.700	6.700	Very similar to the preceding.	Brownish—dirty red, with slight tinge of purple—very slightly coherent—incineration probably not quite complete.
5	1.376	0.88	7.47	87.750	3.900	Color deep black—fracture uneven with appearances of coke or charcoal.	Yellowish red—inclining to brown—dense—coherent.
6	1.395	0.90	7.40	88.650	3.050	This sample is less marked with carbonaceous deposits than the preceding—a purplish red tint marks some of the partings, or cross cleats.	Colour deep fawn, gritty—heavy, coherent.
7	1.382	0.90	7.75	87.200	4.150	Color deep black—surface shining, striated, silky and occasionally of a dull charcoal lustre—fracture uneven, original grain apparently obliterated by pressure.	Bright fawn—with slight tinge of rose colour, gritty, coherent.
8	1.398	1.314	10.54	83.996	4.150	Appears to resemble certain varieties of bituminous coal in structure, fracture and lustre, with slight specks of pyrites.	Bright buff colour, tolerably coherent—slightly gritty.
9	1.378	1.360	5.94	87.000	5.700	Dull black—surface shining at the fractures which cross the grain of the coal—horizontal seams conspicuous, fine carbonaceous dust seen in the interstices.	Incineration not quite perfect, minute particles of coal perceptible—colour deep fawn.
mean	1.390	1.111	6.955	87.360	4.52		

Description of Five new species of American Freshwater Shells. By S. S. HALDEMAN.

Read September 7, 1841, and January 18, 1842.

GENUS AMNICOLA.

AMNICOLA attenuata.—Shell very long and slender, with six obliquely revolving, very convex turns, separated by a deep suture; aperture small, ovate, with the peritreme level and continuous, as in *Cyclostoma*. Length one-third of an inch.

Hab. A spring in Montgomery county, Virginia, connected with Roanoke river.

Observations.—Very like, but more slender than *CYCLOSTOMA lapidaria*, Say; which I refer to this genus, as well as *C. Cincinnatiensis*, Lea; retaining for this species Mr. Anthony's specific name, Sayana, under which appellation the shells were distributed by this gentleman. This substitution is necessary, because the previously described *PALUDINA Cincinnatiensis* is an *Amnicola*. *MELANIA integra*, Say, is an *Amnicola* also.

GENUS PHYSA.

PHYSA globosa.—Shell globose, translucent; spire very short and rounded; aperture very wide, occupying considerably more than half the entire area of the shell; fold well marked, whirls three. Length one-fifth of an inch.

Hab. Mouth of Nolachucky river, attached to submerged rocks, in the rapids.

Observations.—This species is a valuable acquisition to Malacology, as it enables us to place the genus *Ancylus* among the Limneans, where it has hitherto held but a doubtful place. Any one who has examined the animal of *Ancylus*, cannot have failed to observe its similarity to *Planorbis*; and some authors assert that it ascends to the surface of the water to breathe *air*. This I doubted, because the species with which I am familiar, inhabit the interior of bivalve shells, or the surface of stones in rapid water; whence it is impossible for them to rise to the surface, and regain their previous position. I hence infer that they breathe *water*, as well as the *Physa* above described, inhabiting, as it does, the middle of a river, in rapids nearly two feet deep at low water, and without objects rising above the surface. It is highly probable that air-breathing *Ancylus* exist; and it is even possible that the same organ may be adapted to the respiration of both air and water.

GENUS UNIO.

UNIO puniceus.—Shell ovate elliptical, regularly inflated, rather thick in texture; short and obtuse anteriorly; slightly narrowed, and obtusely rounded posteriorly; umbones eroded, and not elevated above the dorsal outline: umbonial slope undefined, posterior slope elevated: anterior teeth thick and direct, posterior ones short and straight: epidermis smooth, yellowish brown, with well-defined dark

green rays upon the posterior portion of the shell : inside light reddish orange. Length 2.2, height 1.2, diameter 0.8 inch.

Hab. Holston river, Washington county, Virginia.

Distinguished from *U. tenebrosus*, by having more robust and direct teeth ; and from *U. Muhlfeldianus*, by being higher and more obtusely rounded in front, and less so posteriorly.

UNIO abacus.—General form of *U. subplanus*, Conrad. Substance of the shell thick, umbones approximate, depressed, anterior, and without internal cavity : posterior slope regularly arched : muscular and pallear impressions very well marked : epidermis brown, rough. Length 3.8, height 2.0, thickness 1.0 inch.

Hab. Holston river, Tennessee.

GENUS ANODON.

ANODON plicatus.—Shell oblong ovate, highest posteriorly, posterior extremity obtusely rounded, and equally so above and below : valves thin, with conspicuous lines of growth : umbones prominent, with strong undulations. Brownish green, obscurely rayed with the latter color. Length 1.8, height 1.0, thickness 0.6 inch.

Hab. Cumberland river, Tennessee.

Differs from *A. incerta* by having more elevated beaks, a darker color, and the posterior extremity more obtuse.

Description of the Nest and Eggs of the Fulica Americana and Anas discors. BY GEORGE C. LEIB, M. D.

Read November 16, 1841.

I saw the *FULICA Americana*, in the month of June, 1841, breeding in the greatest abundance in the marshes bordering on Lake Erie, Erie county, Michigan. They were associated with the Florida gallinules (*GALLINULA galeata*,) which were likewise employed in the labor of reproduction, and so close was the intimacy between them, that their nests were interspersed over the marsh in the most neighborly contiguity, seldom being more than a few feet apart. The nest, rounded in form and rude in structure, is composed entirely of dried or withered rushes, without lining of any sort, slightly interlaced, except at bottom, where there is a simple crossing of the pieces to the depth of several inches.

It is five inches in depth, by a foot and a half to two feet in diameter. This large mass is placed on the surface of the water among the dense rushes, to which it is attached in several points of its circumference, thus rendering it less liable to be swept off by the winds and waves.

When disturbed, these birds emit a note not unlike the cackle of the domestic Hen, which is transmitted from one to the other for a considerable dis-

tance around, till the air becomes vocal with their music. I heard these notes not only during the day, but also at all hours of the night.

The number of the eggs varies from ten to fifteen, though the latter was observed to prevail. They are of an oval form, and measure two inches by one inch and a quarter, uniformly sprinkled with small dark brown spots on a greenish yellow ground. Both male and female assist in incubation.

Owing to their exceeding abundance, they are gathered by the neighboring farmers for the table, and are considered by them superior in flavor and delicacy to the common Hen's egg.

I found the nest of the blue-winged Teal (*ANAS discors*,) together with that of the Mallard (*ANAS boschas*,) in the month of June, in the meadows adjoining the marsh above referred to.

It is composed externally of dried grasses, neatly arranged in a circular form, and lined with a thick bed of down, taken from the breast of the female. It contained eighteen eggs of a delicate cream color, which measure two inches by one inch and a half. Though remarkably timid and wary at other times, such is its abstraction or devotion when upon the nest, that it would suffer me to approach near enough to strike it with a stick; then in the greatest alarm, suddenly flutter and bustle off through the grass for some distance, like a wounded bird; until, satisfied that the ruse had diverted my attention, it would mount into the air and quickly leave the object of its terror and solicitude behind.

Remarks on the so called Pigmy race of the Valley of the Mississippi. By SAMUEL GEORGE MORTON, M. D.

Read November 16, 1841.

It has long been contended by intelligent persons, who, however, were ignorant of Anatomy, that the adjusted bones of individuals of this race never exceed four feet and a half in length, and are often but three feet. These statements induced me to investigate the subject by means of a skeleton of one of these people, which I at length obtained through the kindness of Dr. Troost of Nashville; Dr. A. M'Call, an intelligent correspondent of Dr. Troost, having exhumed these remains from a cemetery near the Cumberland Mountain, in White county, Tennessee.

"The coffins," observes Dr. M'Call, in the letter read by Dr. Morton, "are from 18 to 24 inches in length, by 18 inches deep and 15 wide. They are made of six pieces of undressed sandstone or limestone, in which the bodies are placed with their shoulders and head elevated against the eastern end, and the knees raised towards the face, so as to put the corpse in a reclined or sitting posture. The right arm rested on an earthen pot, of about two pints in capacity, without legs, but with lateral projections for being lifted. With these pots, in

some graves, are found basins and trays also of pipe clay and comminuted shells mixed ; and no one of these repositories is without cooking utensils. In one of the graves was found a complete skull, and an os femoris, but most of the other bones were broken in hastily removing them. This is said to be the largest skeleton ever found at any of these burying grounds.. It has the cranium very flat and broad, with very projecting front teeth, and appears to have pertained to an individual not over twelve or fourteen years of age."

The bones which accompanied the letter indicate a very juvenile subject. For example, many of the deciduous or first teeth yet remain in both jaws ; while the only teeth of the permanent set which have protruded, are the first molars and the incisors, which, as every anatomist knows, make their appearance at about seven years of age. Of the other permanent teeth, some have no part formed but the crown, and all are completely within the maxillary bones. The presence of the new incisors, isolated from the cuspidati which have not appeared, obviously gave rise to Dr. M'Call's remark respecting the very "projecting front teeth," but which, however, are perfectly natural in position and proportion. The cranial bones are thin, and readily separable at the sutures ; nor does the *flat and broad* configuration of the cranium differ from what is common to the aboriginal American race. The long bones have their extremities separated by epiphyses ; and every fact observed in these remains is strictly characteristic of early

childhood ; or about the eighth year of life. Even the recumbent or sitting posture in which they are found, has been observed in the dead bodies of the American nations from Cape Horn to Canada ; and the utensils found with them, are the same in form and composition with those exhumed from the graves of the common Indians.

These remains are to me an additional and convincing proof of what I have never doubted—viz., that the so called Pigmies of the western country, were merely children, who, for reasons not readily explained, but which actuate some religious communities of our own time, were buried apart from the adult people of their tribe.

Description of some new species of Organic Remains of the Cretaceous Group of the United States: with a Tabular View of the Fossils hitherto discovered in this Formation. By SAMUEL GEORGE MORTON, M. D.

Read October 12, and November 7, 1841, and January 25, 1842.

It is now nearly forty years since Messrs. Lewis and Clark, in their expedition to the Columbia river, procured a few fossils at the great bend of

the Missouri river, (Lat. $43^{\circ} 40'$ N.) which I have identified as belonging to cretaceous deposits of the same age as the Marl or Ferruginous sand of New Jersey, Delaware, Alabama, &c. Subsequently Mr. Nuttall brought some additional species, but for the most part in fragments. Very lately, however, my friend Mr. J. N. Nicolle having personally visited parts of that remote region, obtained a series of fossils in far greater perfection and variety than any previous traveller; and of these, it is proposed on the present occasion to indicate the species, and accompany them with a few remarks.

GENUS AMMONITES.

1. *A. mandanensis*. Pl. 10, fig. 2.—Shell compressed, with scarcely two volutions, the inner being received into a superficial fossa of the outer whirl. Internal and external margins armed with pointed tubercles, between which are delicate, gently curved costæ, mostly bifurcated about one-third of the distance from the outer tubercles, beyond which they extend across the periphery of the shell; the latter gently plano-convex. Umbilicus imperforate?

The diameter of the largest specimen has been about three inches; of the smallest I have seen, an inch and a half. In the smaller specimens the internal marginal tubercles are very indistinct; but in other respects this species appears to be but little modified by age.

2. *A. abyssinus*. Pl. 10, fig. 4.—Whirls convex, making two nearly complete volutions, with strong, gently curved, bifurcated ribs, slightly tuberculated at the margin of the dorsal periphery, which they cross to meet the costæ of the opposite side. Umbilicus perforate. Diameter from three-fourths of an inch to one inch.

This species is strikingly different from the *A. mandanensis* in the greater size of its costæ, its perforate umbilicus, and its convex dorsal periphery.

3. *A. Nicolletii*. Pl. 10, fig. 3.—Shell convex, rapidly enlarging towards the mouth, with at least two volutions, one received deeply into the other; costæ delicate, gently curved, and bifurcate towards the convex dorsal periphery, which they cross in arched lines, between numerous minute tubercles.

I have much pleasure in dedicating this interesting species to my friend Mr. Nicollet, whose zeal and intelligence have contributed largely to the development of American science.

Some years since I saw several specimens of *Ammonites* which were obtained by Judge Bry, in the township of Wachita, in Louisiana. I have elsewhere (Synop. p. 24,) considered them as indications of cretaceous deposits; and my recollection induces me to believe that their characters correspond either to *A. abyssinus* or *A. Nicolletii*.

GENUS HIPPONYX.

H. borealis. Pl. 11, fig. 6.—Apex marginal; body carinated from apex to base; shell smooth.

Basal diameter, one inch and a half.

This is the second species of the genus which occurs in the cretaceous strata of the United States. I some years since described the *PATELLA* (*HIPPONYX*) *tentorium*, from New Jersey. Synop. p. 50.

GENUS CYTHEREA.

C. Missouriiana. Pl. 11, fig. 2.—Convex, with strong concentric striæ; beaks angular. Diameter one inch.

GENUS TELLINA.

T. occidentalis. Pl. 11, fig. 3.—Shell thin, compressed, with distant concentric striæ. Diameter one inch.

Besides the preceding fossils Mr. Nicollet obtained the following species from the same interesting locality.

AMMONITES Conradi, (M.) Synop. pl. 16, fig. 1, 2, 3. Large and beautifully preserved specimens.

AMMONITES placenta, (Dekay.) Synop. pl. 2, fig. 1. This species is found from comparatively small dimensions to a gigantic size, probably not less than two or three feet in diameter.

INOCERAMUS *Barabini*, (M.) Synop. pl. 17, fig. 3, and pl. 13, fig. 11. This shell has hitherto been found only in Greene county, Alabama, but appears to be abundant in the Mandan country, often compressed and broken, but readily identified.

BACULITES *compressus*, (Say.) Synop. pl. 9, fig. 1. This species so nearly resembles *B. ovatus* of the same naturalist, from the marls of New Jersey, that I am almost disposed to consider them identical. The species in question is found of gigantic dimensions; for example, more than a foot in length and three or four inches in diameter.

BELEMNITES *Americanus*, (M.) Synop. pl. 1, fig. 1, 2, 3.

Hence, it appears, that among the small number of species noticed on this occasion, at least four are found in deposits of the same age on this side of the Mississippi, thus identifying the cretaceous strata over an immense geographical area, which commences in New Jersey and perhaps at Martha's Vineyard, is traced in all the Atlantic states to Georgia, thence through Alabama and Mississippi, across the Mississippi to Louisiana and Arkansas, where it is seen on the plains of the Kiamesha. From this point, until we approach the Great Bend of the Missouri river, in the Mandan country, it has not yet been traced; but in the last named region, about seven hundred miles above the mouth of the Missouri, it becomes again conspicuous as already stated, abounding in characteristic organic

remains of great beauty. The extent of this deposit is not yet known: it is probable that it occupies a very large area, and is destined to become one of the most interesting and prolific fossil localities that has tempted the enterprise of geologists. These fossils are remarkable alike for their admirable preservation and their great beauty; the latter being much heightened by the presence of an opalescent nacre which has been rarely noticed in the other cretaceous beds of this country.

The fossils brought by Mr. Nicollet were found by him near the confluence of the Sioux and Missouri rivers, in a thick stratum of clay, which was traced over an extent of 400 miles, and which, from information obtained by that intelligent traveller, probably extends to the Running-water, White and Shayanne rivers, and north west as far as the Yellow-stone, a distance of nearly a thousand miles.

GENUS AMMONCERATITES.

A. Conradi. Pl. 10, fig. 1.—Shell with an entire whirl, somewhat compressed, with numerous, distinct, slightly curved costæ, which diminish and become almost extinct at the internal peripheral margin: external periphery sub-angular, and undulated by the transit of the costæ.

This specimen is a cast in dark gray ferruginous sand, charged with minute scales of mica. The terminal end is nearly complete, and almost on a line with what appears to have been the mouth of

the shell, and the two approach within a quarter of an inch of each other. Diameter two and a half inches.

This is the first example of an *Ammonceratite* found in the United States. It was obtained from a marl pit near Arneytown, New Jersey, by my friend Mr. Conrad, in whose name I gladly introduce it to notice.

This genus is characteristic of the European chalk, having been found both in England and France in deposits of that age; thus affording another evidence of the analogy between the cretaceous deposits of the old world with the marl strata of the new.

GENUS HAMITES.

H. annulifer. Pl. 11, fig. 4.—Shell small, cylindrical, equal; the external two-thirds convex, the internal third concave, with numerous delicate, distinct and closely approximated rings, which encircle the whole shell.

One end of this remarkable species has the characteristic curve and septa of the genus *Hamites*. The concave surface looks as if designed to receive the cylinder of the opposite side. Length nearly one inch.

Found by Mr. Conrad in the Ferruginous sand at the Deep-cut of the Chesapeake and Delaware canal.

GENUS PINNA.

P. rostriformis. Pl. 10, fig. 5. — Shell thin, elongated, narrow, smooth, but gently undulated from the beak to the opposite extremity.

This fossil is not uncommon in fragments in the medial cretaceous limestone of Timber Creek, in Gloucester county, New Jersey ; but this instance is the first which has occurred sufficiently perfect for description. I have referred to it in my "Synopsis of Organic Remains," page 63, but did not then venture to give it a specific designation. The specimen now in question was found and kindly lent me by Mr. Conrad.

GENUS TEREBRATULA.

T. atlantica.—Shell ovate, valves equally convex, with numerous, distinct, and bifurcating striæ, most prominent on the umbo ; foramen large ; beaks not incurved. Length of the largest specimen five-eighths of an inch ; width half an inch.

From the ferruginous sand at Woodward's Farm, New Jersey, where it was found by Mr. Conrad.

I regret that this species was inadvertantly overlooked in preparing the annexed illustrations.

GENUS PLANULARIA.

P. cuneata. Pl. 11, fig. 5.—Shell ovate, slightly angulated in the middle ; one side slightly concave, with concentric lines, which are angular in the centre of the disk. Length three-tenths of an inch.

From the middle cretaceous strata of New Jersey, where it was found by Mr. Conrad.

GENUS CIDARITES.

C. armiger.* Pl. 11, fig. 1.—Scutellæ pentagonal, granulated at the margin, between which and the papilla the surface is smooth and sub-conical. Scutellæ in pairs? separated by longitudinal, granulated, slightly curved bands. Spines elongated, longitudinally granulated, and attached to the papillæ by numerous very small, flattened appendages.

Found with the preceding fossil in the medial cretaceous limestone of New Jersey.

GENUS PTYCODUS.

P. Mortoni, (Mantell.) Pl. 11, fig. 7.—The palates of a Fish belonging to the genus *Ptycodus*, were found by Mr. Conrad in the older cretaceous strata at Prairie Bluff, Alabama, and are figured without a name in my Synopsis, pl. 18, fig. 1, 2. I subsequently sent specimens of them to my distinguished friend Dr. Mantell, who returned me three beautiful drawings, (which are accurately copied on the annexed plate,) with the name *PTYCODUS Mortoni* appended. Dr. Mantell, however, has not yet informed me in what work the description is published.

* First indicated by me in the Proceedings of the Acad. vol. i, p. 132, by the name of *C. splendens*.

Tabular View of the Organic Remains hitherto discovered in the Cretaceous Strata of the United States.

In some "Additional Observations" added to my "Synopsis of Organic Remains,"* I have suggested, with Mr. Conrad's valuable assistance, three great divisions of the cretaceous deposits of this country, which I have called *Upper*, *Medial*, and *Lower*.

1. The UPPER DIVISION embraces the Nummulite limestone of Alabama, which has been traced by Mr. Conrad from a point six miles west of Claiborne, to St. Stephen's, on the Tombecbee river, being especially characterized by the presence of *PLAGIOSTOMA dumosum*, and NUMMULITES *Mantelli*. I formerly included in this series the friable white limestone west of the city of Charleston, in South Carolina; but the recent researches of Mr. Lyell prove that this deposit belongs to the Eocene period, to which must now be transferred the following species of organic remains, which I have classed in my Synopsis with the cretaceous series:

CONUS gyratus, (M.)

OSTREA sellæformis, (Conrad.)

PECTEN calvatus, (M.)

PECTEN membranosus, (M)

* Synopsis of the Organic Remains of the Cretaceous Group of the United States. Illustrated by nineteen plates. 8vo. Philadelphia: 1834. The Additional Observations were only added to the copies embraced in the latter part of the edition.

TEREBRATULA *lacryma*, (M.)

BALANUS *peregrinus*, (Conrad.)

ECHINUS *infulatus*, (M.)

SCUTELLA *crustuloides*, (M.)

2. The MEDIAL DIVISION is seen in New Jersey, extending from Vincenttown to Salem, embracing the interesting limestone beds of Timber Creek, which were first described by me in the year 1827.* This medial division I have supposed to be contemporaneous with the European white chalk.

3. The LOWER DIVISION embraces the vast ferruginous sand deposits of the Atlantic States, from the island of Martha's Vineyard on the north, to South Carolina, whence it is traced south and west across the Mississippi, as heretofore indicated, into Louisiana, Arkansas, and Missouri. These strata are obviously contemporaneous with those European deposits which lie between the white chalk and oolite, and are called by the various names of ferruginous sand, iron sand, green sand, chalk marl, &c., according to their mineralogical characters.

In this table I propose to arrange the fossils in three groups, answering to the three divisions above indicated, and beginning with the newest.

FIRST GROUP.

Upper Cretaceous Strata.

SQUALUS, several species.

NAUTILUS *Alabamensis*, (M.) Synop. pl. 18, fig. 3.

* Jour. Acad. vol. vi.

- NUMMULITES *Mantelli*, (M.) Synop. pl. 5, fig. 9.
 OSTREA *panda*, (M.) Synop. pl. 3, fig. 6; and pl. 19, fig. 10.
 OSTREA *cretacea*, (M.) Synop. pl. 19, fig. 3.
 PECTEN *anatipes*, (M.) Synop. pl. 5, fig. 4.
 PECTEN *perplanus*, (M.) Synop. pl. 5, fig. 5; and pl. 15, fig. 8.
 PECTEN *Poulsoni*, (M.) Synop. pl. 19, fig. 2.
 PLAGIOSTOMA *dumosum*, (M.) Synop. pl. 16, fig. 8, and page 60.
 SCUTELLA *Rogersi*, (M.) Synop. pl. 13, fig. 3.

SECOND GROUP.

Medial Cretaceous Strata.

- SQUALUS, *several species.*
 CROCODILUS ———. Synop. pl. 11, fig. 12.
 BELEMNITES? *ambiguus*, (M.) Synop. pl. 1, fig. 4, 5.
 PLANULARIA *cuneata*, (M.) Jour. Acad., vol. 8, pl. 11, fig. 5.
 SCALARIA *annulata*, (M.) Synop. pl. 3, fig. 10.
 CIRRUS *crotalloides*, (M.) Synop. pl. 19, fig. 5.
 VERMETUS *rotula*, (M.) Synop. pl. 1, fig. 14.
 GRYPHŒA *vomer*, (M.) Synop. pl. 9, fig. 5.
 PINNA *rostriformis*, (M.) Jour. Acad., vol. 8, pl. 10, fig. 5.
 TEREDO *tibialis*, (M.) Synop. pl. 9, fig. 2.
 CIDARITES *diatretum*, (M.) Synop. pl. 10, fig. 10.
 CIDARITES *armiger*, (M.) Jour. Acad., vol. 8, pl. 11, fig. 1.
 NUCLEOLITES *crucifer*, (M.) Synop. pl. 3, fig. 15.

ANANCHYTES *cinctus*, (M.) Synop. pl. 3, fig. 19.

ANANCHYTES *fibriatus*, (M.) Synop. pl. 3, fig. 20.

FLUSTRA *sagena*, (M.) Synop. pl. 13, fig. 7.

ESCHARA *digitata*, (M.) Synop. pl. 13, fig. 8.

RETEPORA ———, *fragments*.

ANTHOPHYLLUM *Atlanticum*, (M.) Jour. Acad., vol. 6, pl. 8, fig. 9 and 10; and Synop. pl. 1, fig. 9 and 10.

ALVEOLITES *cepcularis*, (M.) Synop. page 80.

ALCYONIUM : both cups and stems.

Beside the preceding fossils, this group embraces indeterminate casts and fragments of *Trochus*, *Crassatella*, *Rostellaria*, *Cancer*, &c.

THIRD GROUP.

Lower Cretaceous Strata.

MOSÆSAURUS, (Coneybeare.) Jour. Acad., vol. 4, pl. 14; and Synop. pl. 11, fig. 9.

GEOSAURUS. Synop. pl. 11, fig. 10.

CROCODILUS. Synop. pl. 11, fig. 12.

TESTUDO. *Bones*.

SAUROCEPHALUS, (Saurodon,) *Leanus*, (Hays.) Amer. Phil. Trans., vol. 3, pl. 16.

SAUROCEPHALUS *lanciformis*, (Harlan.) Jour. Acad. vol. 4, pl. , fig. .

*GALEUS *pristodontus*. Synop. pl. 11, fig. 6.

LAMNA *acuminata*. Synop. pl. 11, fig. 11.

LAMNA *Mantelli*. Synop. pl. 11, fig. 4.

LAMNA *obliqua*. Synop. pl. 11, fig. 1.

*These species and genera of Linnean SQUALI were identified by M. Agassiz, from an examination of my plates of the teeth,

- LAMNA *lanceolata*. Synop. pl. 11, fig. 5.
- CARCHARIAS *lanceolatus*. Synop. pl. 12, fig. 3 and 5.
- CARCHARIAS *myalotis*. Synop. pl. 12, fig. 4.
- CARCHARIAS *polygurus*. Synop. pl. 12, fig. 2.
- PTYCODUS *Mortoni*, (Mantell.) Synop. pl. 18, fig. 1 and 2; and Journ. Acad., vol. 8, pl. 11, fig. 7.
- SPHYRÆNA. Synop. pl. 12, fig. 1.
- RHYNCOLITES? (Blainville.)
- NAUTILUS *Dekayi*, (M.) Synop. pl. 8, fig. 4; and pl. 13, fig. 4.
- BELEMNITES *Americanus*, (M.) Synop. pl. 1, fig. 1, 2, 3; and Jour. Acad., vol. 6, pl. 8, fig. 1, 2, 3.
- AMMONITES *placenta*, (Dekay.) Synop. pl. 2, fig. 1, 2.
- AMMONITES *Delawarensis*, (M.) Synop. pl. 2, fig. 5; and Amer. Jour. Sci., vol. 18, pl. 2, fig. 4.
- AMMONITES *Vanuxemi*, (M.) Synop. pl. 2, fig. 3, 4; and Amer. Jour. Sci., vol. 18, pl. 3, fig. 3, 4.
- AMMONITES *tehiſer*, (M.) Synop. pl. 2, fig. 7.
- AMMONITES *Conradi*, (M.) Synop. pl. 16, fig. 1, 2, 3; and pl. 19, fig. 4.
- AMMONITES *syrtalis*, (M.) Synop. pl. 14, fig. 4.
- AMMONITES *verpertinus*, (M.) Synop. pl. 17, fig. 1.
- AMMONITES *mandanensis*, (M.) Jour. Acad. vol. 8, pl. 10, fig. 2.
- AMMONITES *abyssinus*, (M.) Jour. Acad., vol. 8, pl. 10, fig. 4.
- AMMONITES *Nicolletii*, (M.) Jour. Acad., vol. 8, pl. 10, fig. 3.

AMMONCERATITES, *Conradi*, (M.) Journ. Acad. vol. 9, pl. 10, fig. 1.

SCAPHITES *hippocripis*, (Dekay.) } Synop. pl. 7.
Syn. S. Cuvieri, (M.) } fig. 1.

SCAPHITES *reniformis*, (M.) Synop. pl. 2, fig. 6.

BACULITES *ovatus*, (Say.) Synop. pl. 1, fig. 6, 7,
 8; and Amer. Jour. of Med. Sci., vol. 18, pl. 1,
 fig. 6, 7, 8.

BACULITES *compressus*, (Say.) Synop. pl. 9, fig. 1.

BACULITES *asper*, (M.) Synop. pl. 1, fig. 12, 13;
 and pl. 13, fig. 2.

BACULITES *columna*, (M.) Synop. pl. 19, fig. 8.

BACULITES *carinatus*, (M.) Synop. pl. 13, fig. 1.

BACULITES *labyrinthicus*, (M.) Synop. pl. 13, fig.
 10.

HAMITES *arculus*, (M.) Synop. pl. 15, fig. 1, 2.

HAMITES *torquatus*, (M.) Synop. pl. 15, fig. 4.

HAMITES *trabeatus*, (M.) Synop. pl. 15, fig. 3.

HAMITES *annulifer*, (M.) Journ. Acad. vol. 8, pl. 11,
 fig. 4.

PLANULARIA *cuneata*, (M.) Jour. Acad., vol. 8, pl.
 11, fig. 5.

BULLA, *casts of two species.*

TROCHUS *leprosus*, (M.) Synop. pl. 15, fig. 6.

DELPHINULA *lapidosa*, (M.) Synop. pl. 19, fig. 7.

TURRITELLA *vertebroides*, (M.) Synop. pl. 3, fig. 13.

TURRITELLA *encrinoides*, (M.) Synop. pl. 3, fig. 7.

SCALARIA *Sillimani*, (M.) Synop. pl. 13, fig. 9.

ROSTELLARIA *arenarum*, (M.) Synop. pl. 5, fig. 8.

ROSTELLARIA *pennata*, (M.) Synop. pl. 19, fig. 9.

TORNETELLA? *bullata*, (M.) Synop. pl. 5, fig. 3.

- NATICA *petrosa*, (M.) Synop. pl. 19, fig. 6.
 NATICA *abyssina*, (M.) Synop. pl. 13, fig. 13.
 CIRRHUS *crotaloides*, (M.) Synop. pl. 19, fig. 5.
 CYPRÆA, *a solitary cast*.
 PATELLA (HIPPONYX?) *tentorium*, (M.) Synop. pl. 1, fig. 11.
 HIPPONYX *borealis*. Jour. Acad., vol. 8, pl. 11, fig. 7.
 OSTREA *falcata*, (M.) Jour. Acad., vol. 6, pl. 1, fig. 2; and Synop. pl. 3, fig. 5; and pl. 9, fig. 67.
 OSTREA *phumosa*, (M.) Synop. pl. 3, fig. 9.
 OSTREA *panda*, (M.) Synop. pl. 3, fig. 6; and pl. 19, fig. 10.
 OSTREA *torosa*, (M.) Synop. pl. 10, fig. 1.
 GRYPHÆA *convexa*, (Say.) Synop. pl. 4, fig. 1 and 2.
 GRYPHÆA *mutabilis*,* (M.) Synop. pl. 4, fig. 3.
 GRYPHÆA *vomer*, (M.) Synop. pl. 19, fig. 5.
 GRYPHÆA *Pitcheri*, (M.) Synop. pl. 15, fig. 9.
 EXOGYRA *costata*, (Say.) Synop. pl. 6, fig. 1—4.
 PECTEN *quinquecostatus*, (Sowerby.) Synop. pl. 19, fig. 1.
 PECTEN *craticula*, (M.) Synop. page 57.
 PECTEN *venustus*, (M.) Synop. pl. 5, fig. 7.
 PLAGIOSTOMA *gregale*, (M.) Synop. pl. 5, fig. 6.
 PLAGIOSTOMA *pelagicum*, (M.) Synop. pl. 5, fig. 2.
 PLAGIOSTOMA *echinatum*, (M.)
 ANOMIA *argentaria*, (M.) Synop. pl. 5, fig. 10.
 ANOMIA *tellinoides*, (M.) Synop. pl. 5, fig. 11.
 PLACUNA *scabra*, (M.) Synop. page 62.

*This shell and *G. convexa* are probably varieties of the same species, although their extremes are very unlike.

PLICATULA urticosa, (M.) Synop. pl. 10, fig. 2.

INOCERAMUS Barabini, (M.) Synop. pl. 17, fig. 3;
and pl. 13, fig. 11.

INOCERAMUS alveatus, (M.) Synop. pl. 17, fig. 4.

AVICULA laripes, (M.) Synop. pl. 17, fig. 5.

PECTUNCULUS hamula, (M.) Synop. pl. 15, fig. 7.

PECTUNCULUS australis, (M.) Synop. page 64.

ARCA rostellata, (M.) Synop. pl. 3, fig. 11.

CUCULLÆA vulgaris, (M.) Synop. pl. 3, fig. 8; and
pl. 13, fig. 5.

CUCULLÆA antrosa, (M.) Synop. pl. 13, fig. 6.

TRIGONIA alæformis, Sowerby. } Synop. pl.
Syn. TRIGONIA thoracica, (M.) } 15, fig. 13.

CARDITA decisa, (M.) Synop. pl. 9, fig. 3.

CRASSATELLA vadosa, (M.) Synop. pl. 13, fig. 12.

VENILIA Conradi, (M.) Synop. pl. 8, fig. 1, 2.

TELLINA occidentalis, (M.) Jour. Acad., vol. 8, pl.
11, fig. 3.

CYTHEREA excavata, (M.) Synop. pl. 5, fig. 1.

CYTHEREA Missouriiana, (M.) Jour. Acad., vol. 8,
pl. 11, fig. 2.

PHOLADOMYA occidentalis, (M.) Synop. pl. 8, fig. 3.

PHOLAS cithara, (M.) Synop. pl. 9, fig. 10.

TEREDO tibialis, (M.) Synop. pl. 9, fig. 2.

CLAVAGELLA armata, (M.) Synop. pl. 9, fig. 11.

TEREBRATULA Harlani, (M.) Synop. pl. 3, fig. 1;
and pl. 9, fig. 8, 9.

TEREBRATULA fragilis, (M.) Synop. pl. 3, fig. 2.

TEREBRATULA Sayi, (M.) Synop. pl. 3, fig. 3
and 4.

TEREBRATULA Floridana, (M.) Synop. pl. 16,
fig. 7.

TEREBRATULA *lachryma*, (M.) Synop. pl. 10, fig. 11; and pl. 16, fig. 6.

TEREBRATULA *Atlantica*, (M).

SERPULA *barbata*, (M.) Synop. pl. 15, fig. 12.

HAMULUS *onyx*, (M.) Synop. pl. 2, fig. 8; and pl. 16, fig. 5.

CASSIDULUS *æquoreus*, (M.) Synop. pl. 3, fig. 14.

CLYPEASTER *florealis*, (M.) Synop. pl. 3, fig. 12 and pl. 10, fig. 12.

CLYPEASTER *geometricus*, (M.) Synop. pl. 10, fig. 9.

SCUTELLA *Lyelli*, (Conrad.) Synop. pl. 10, fig. 8.

SPATANGUS *parastatus*, (M.) Synop. pl. 3, fig. 21.

SPATANGUS *ungula*, (M.) Synop. pl. 10, fig. 6.

ANTHOPHYLLUM *Atlanticum*, (M.) Synop. pl. 1, fig. 9 and 10.

TURBINOLIA *inauris*, (M.) Synop. pl. 15, fig. 11.

With the preceding species are found fragments and casts of *Tellina*, *Lunulites*, *Cardium*, *Nucula*, *Pinna*, *Astacus*, *Cancer*, &c.

In the splendid work of M. Leopold de Buch, entitled "Pétrifications Recueillies en Amérique, par M. Alexandre de Humboldt," some new and very interesting light is thrown on the cretaceous deposits of South America. M. de Buch states that these strata decidedly preponderate on the Andes, between the 10° and 15° of south latitude, where they are replete with characteristic organic remains, and attain the astonishing elevation of 13,000 feet above the level of the sea. Among the fossils brought by Humboldt is the *TRIGONIA alæformis* of Sowerby, which I find, at the suggestion of M.

de Buch, is identical with the *T. thoracica* of my Synopsis; while, among the same series of fossils, that illustrious geologist thinks he has identified the *ARCA rostellata*, (nobis,) which was first found in Alabama.

Since the appearance of M. de Buch's work, Mr. Isaac Lea of this city has read an interesting memoir on a series of fossils from the same formation, which, however, he refers to the Oolite series.* On this question I decidedly agree with M. de Buch, that those remains are not Oolitic, but Cretaceous. I arrive at this conclusion from the *character* of the fossils themselves; for, as I have already remarked, of the small number that has been hitherto examined, at least one species has been found in the cretaceous strata of the United States. Again, Mr. Lea describes what he considers an Orthocera, (*O. Humboldtiana*,) and respecting which he remarks, that "it is important in connexion with these fossils, as it proves them to belong to the lower series of the Oolitic group." So far as it may be allowable to judge from Mr. Lea's drawing, for I have not seen the specimen, I have no hesitation in pronouncing the fossil in question either a *Hamite* or a *Baculite*, but most probably the straight crus of the former. Both these genera are abundant in, and characteristic of the chalk formation every where. As a further evidence derived from Mr. Lea's memoir, I may cite his *TRIGONIA Hondaana*, which appears to be the *T. alæformis*, figured by

*Trans. of the Amer. Philos. Soc., vol. vii, p. 251.

De Buch from South America, and by myself (under the name of *T. throracica*, which I have relinquished,) from Alabama. (Synop. pl. 15, fig. 13; De Buch, fig. 10.)

The cretaceous fossils hitherto ascertained to be common to Europe and America, are the *TRIGONIA alæformis*, and *PECTEN quinquecostatus*, together with several species of Fishes, viz.; *GALEUS pristodontus*, *LAMNA acuminata*, *SAUROCEPHALUS lanciformis*, *S. Leanus*, and a few others. It has also been suggested, by some European geologists, that the *GRYPHÆA convexa* and *G. mutabilis* (*OSTREA convexa*, Say,) are identical with the *OSTREA vesicularis* of the European chalk. This can only be decided by a more extended comparison of specimens; but I am strongly disposed to the affirmative view of the question, since the beautiful illustrations contained in Goldfuss's *Petrifecten*, Tab. 81.

The analogue of my *OSTREA falcata*, if not the identical species, is found in the chalk of Europe, and is seen in the *OSTREA lunata* of Heisinger, (*Petrifacta Sueciæ*, Tab. 14, fig. 4,) under which name it is also figured in Goldfuss, Tab. 75, fig. 4. These examples represent the variety indicated by me under the name of *O. mesenterica*, (Synop. pl. 9, fig. 6,) but the *O. larva* of Lamark and Goldfuss, (*Petrifecten*, Tab. 75, fig. 1,) seems in no respect to differ from my *O. falcata*, as originally described. (Synop. pl. 3, fig. 5.)

Again, the *GRYPHÆA vomer*, (nobis,) appears to be specifically identical with *OSTREA lateralis* of

Nilson, as figured in Goldfuss, Tab. 82, fig. 1;* my *TROCHUS leprosus*, from Alabama, is very closely allied to the *TROCHUS onustus* of Heisinger, (Pet. Sueciæ, Tab. 11, fig. 4;) and finally, the remains of the *Mosasaurus* of America cannot be distinguished from those of the same animal found in Europe.

Mr. Conrad has even detected a thin stratum of *Galt* at Erie, Alabama, which is characterized by the *HAMULUS onyx*, and a species of *INOCERAMUS*, hitherto found only in fragments too imperfect for description.

In reviewing the preceding facts, I have only to repeat the opinion expressed by me at the conclusion of my Synopsis,—that when the chalk fossils were living inhabitants of the seas of Europe, the organic relics described in this memoir were alive in the ocean of America; in other words, that they were contemporaneous beings. Whatever cause laid bare the eastern portion of the series, appears to have acted simultaneously on the western mass; not a rush of currents, but either a subsidence of the sea, or an elevation of the land, which has left the fossils in their original beds, unbroken, and, as to their external forms, unaltered.

* See also Deshayes's edit. of Lamarck, tome vii, p. 258.

Observations on the Silurian and Devonian systems of the United States, with descriptions of new Organic Remains. By T. A. CONRAD.

Read January 18, 1842.

NEARLY all the Organic Remains described in the following pages are limited to the Silurian and Devonian systems, both of which it is now ascertained are admirably developed within the limits of the Union, the former especially, which is now conceded to be the most perfect series of the older Palæozoic rocks, (Transition of the old nomenclature) yet discovered in any part of the world. In the perfection or unbroken chain of this series or system, the State of New York is pre-eminent, comprising within her borders more than twenty distinct formations of the Silurian system, each characterized by a peculiar group of organic remains. These rocks are nearly all gently inclined, and being undisturbed and rising in terraces, their phenomena, order of sequence, and thickness, are admirably developed. The geologist can there investigate the first types of animal existence, their well preserved exuvixæ occurring immediately above the primary or granitic rocks, and can trace these various forms from the period of their creation to their extinction; he will then observe the introduction of new genera and species, and examine each link in the great chain of progressive existence; a

study which gives more than ordinary interest to the natural history of our own era, contrasting the vast number of various kinds of land animals which now exist with the total absence of them in the Silurian period, and the multitude of genera and species of the TESTACEA of the present seas, with the comparatively very few preserved in the Silurian rocks.

The Cambrian, which was supposed to underlie the Silurian system, having proved to be composed of members of the latter group, I include in our Silurian, the fossiliferous rocks immediately above the primary, in consecutive order, to the Tully limestone inclusive. The Trenton limestone, and three or four formations below, appear to be geologically older than any of the Silurian rocks yet discovered in Great Britain; at least the characteristic fossils have not there been observed; whilst the Caradoc sandstone is certainly of the same age with the rocks above the Trenton limestone, and below the Niagara shale. Of the trilobites of the Trenton limestone, I can recognize only two species common to both sides of the Atlantic, the *TRINUCLEUS tessellatus*, Green, which occurs in Ireland, and *CALYMENE punctata*, of the Caradoc sandstone, in Trenton limestone at Glenn's Falls, New York. I have it also in grit of the Clinton group from Medina. This species is the same as *ASAPHUS micropleurus*, (Green.)

Several species of shells figured among the Caradoc fossils in Murchison's Silurian Researches, oc-

cur in this limestone. The following table of the Lower Silurian formations will exhibit the strata which I suppose to be equivalent in age to those of Europe.

Lower Silurian Strata.	{	10. Clinton group.	}	<i>Caradoc equivalents.</i>
		9. Niagara sandstone.		
		8. Shales of Salmon river.		
		7. Black shale.		
	{	5. Trenton limestone.	}	<i>Wanting in Europe?</i>
		4. Mohawk limestone.		
		3. Bird's-eye limestone.		
		2. Calcareous sandstone.		
		1. Potsdam sandstone.		

Of these rocks, the shales and sandstones of Salmon river are not represented in England, but appear to be in some parts of the continent of Europe.

These lower Silurian rocks, dipping slightly to the south-west, disappear beneath those of the Middle series, a short distance south of the Erie canal, but I have abundant proof of their reappearance in Ohio, Indiana, Kentucky, and Missouri, some of which evidence is afforded by the splendid series of western organic remains in the collection of the Academy.

Among the trilobites, the genus *Isotelus* is limited to the Lower Silurian group, and occurs near the lead mines of Missouri; also, on the Ohio river near Cincinnati. The strata of the middle portion of this series are clearly developed at Richmond, Indiana, where the following species occur: PEN-

TAMERUS *oblongus*,* which we find at the top of the Lower Silurian series, near Rochester, New York; PTERINEA *carinata*, and CYPRICARDITES *curta*, which, in New York, are limited to the rocks of the Salmon river group. The PLEUROTOMARIA *expansa*, of the same rocks, occurs at Pendleton, Indiana.

In the last year's report on the New York geological survey, I stated that the Trenton limestone, and the black slate of Utica and the Mohawk valley, occur in the vicinity of Cincinnati, the former characterized by the genus *Isotelus* and other organic remains, and the latter by the trilobite termed

* In Silliman's Journal, for January, 1842, Mr. Hall observes: "The PENTAMERUS *oblongus*, or a species so similar that I am unable to distinguish it, occurs in the Niagara limestone in Iowa, and also in Ohio, as I am informed, not having seen it myself in the latter place. Should such be the fact, it proves the existence of this shell for a long period after the destruction of the same in New York." I have no doubt that the "Clinton or Protean" group of New York, in which this *Pentamerus* occurs, is confounded by Mr. Hall with the Niagara limestone, and that the shell is limited to the former strata. Judging from organic remains obtained in the west, I infer that the *Pentamerus* limestone of Rochester, (there an insignificant stratum as regards its thickness,) is greatly expanded in Ohio and Indiana, changed in lithological character, and though retaining the most characteristic species of the Clinton group, yet holding other species not hitherto observed in New York. Mr. Hall also remarks, that "the *Catenipora* is the characteristic fossil of the upper part of the Niagara limestone, and confined to this rock." The genus *Catenipora*, and apparently the *C. escaroides*, cannot be considered as characteristic of any particular formation, except by its peculiar abundance, for it has a range throughout the Silurian rocks hardly equalled by any other fossil. In 1837, I found it in the iron ore beds of the Clinton group, and last summer in the shale at Moscow, Livingston county, New York; thus it occurs in the Lower, Middle, and Upper Silurian divisions.

TRIARTHURUS Beckii. Mr. Hall, who has since visited Ohio, arrives at the same conclusion.—*Silliman's Journal*, vol. xlii, p. 61. The Trenton limestone forms the bed of the Ohio from Cincinnati to the falls near Louisville, Kentucky, at which latter place it appears to be exposed only in a very low stage of the water. The *EUOMPHALUS corndensis*, a Caradoc sandstone fossil, figured in Murchison's *Silurian Researches*, occurs at this locality, but I am not certain of its having been obtained from the Trenton limestone.

The Middle Silurian series commences with the Niagara shale, which is nearly or quite of the same age with the Wenlock shale of Murchison, and I propose to terminate this series with the Oriskany sandstone, an excellent line of demarcation, well developed in Pennsylvania (No. 7 of the geological reports) and Kentucky; and it is at the same time admirably distinct in its group of fossils from the rocks either above or below it. The rock overlying it corresponds with the Lower Ludlow rock of Murchison, and is the first or oldest member of the Upper Silurian strata, which terminate in the ascending order with the Tully limestone. The rocks of the Ithica group, Chemung group, and the Old Red Sandstone near Blossburg, in Pennsylvania, constitute the equivalents of the Devonian system as developed in Europe, and contain a number of the organic remains which characterize the Devonian strata.

Of the Middle series, the upper rock, or Oriskany sandstone, affords an excellent section in the

Juniata valley, Pennsylvania, where the *ATRYPA elongata*, a highly characteristic fossil, abounds. In the collection of the Academy are specimens of the same species, from Garrard county, Kentucky. There is also in the collection a shell, which characterizes the limestone immediately beneath the Oriskany sandstone near Schoharie, in New York, *ATRYPA æquiradiata*, from Kentucky. Of the upper series, there are in the same collection specimens of *DELTHYRIS acuminata*, from the Falls of the Ohio river, a species characteristic of the Onondaga limestone. A bivalve, occurring only in the Devonian rocks, (*ATRYPA Chemungensis*,) is in the collection, which was found in Kentucky, proving that rocks of that era also occur in the west.

The three divisions of the system termed Silurian by Mr. Murchison, are quite as distinct from each other by their types of organic exuviæ, as the Silurian is from the Devonian system. This consideration leads me to propose distinct terms for those divisions, to which they are fully as well entitled as any of the large groups of later date. Thus, the lowest or oldest section may be termed the Mohawk system, or lower Silurian group; the middle, the Helderberg system, or middle Silurian group; and the upper the Onondaga, or upper Silurian group. These systems are better defined by distinct genera of trilobites than by any other character, and are founded wholly upon my own investigations and study of the palæontology of New York. The following table shows the genera of trilobites peculiar to each system. It is worthy of

note, that no trace of terrestrial vegetation has yet been discovered below the Onondaga system, and of this the species are few, rare, and are even doubtful as to their terrestrial origin.

<i>Genera of Crustacea.</i>	<i>Shells.</i>	<i>Crinoidea.</i>
Onondaga system. { Cryphæus. Odontocephalus. Homalonotus.	Many species of <i>Avicula</i> abound here; a genus comparatively rare in the Helderberg strata, and still more so in the Ontario rocks.	
Helderberg system. { Dicranurus. Trimerus. Platynotus. Acidapsis. Acantholoma. Eurypterus. Craspidurus.	Platyceras. Many species in this system; few above and none below.	Caryocrinus, Lepocrinus, and various other forms peculiar to this system.
Mohawk system. { Hemicropterus. Illænus. Triarthrus. Isotelus. Ceraurus. Trinucleus.	Orthostoma. Trocholites. Cyrtolites. Phragmolites.	

The Devonian system represented by the rocks of Ithica, the lower division, by the strata on the Chemung river or middle division, and the red sandstone of Blossburg or upper division, may be conveniently divided, as here indicated, by peculiar groups of organic remains. The lower, or Ithica rocks, many hundred feet thick, contain quite a distinct class of fossils, either from the Silurian be-

low, or from the Chemung strata above. The Chemung rocks, I have ascertained, hold many forms analogous to the rocks of Devon, which constitute the Devonian system; and some identical species of which the following is a list: STROPHOMENA (LEPTÆNA) *membranacea*, Phillips; DELTHYRIS *perlata*, Conrad; (SPIRIFERA *calcarata*, Phillips, not Sowerby;) AVICULA *pectinoides*, Sowerby; ATRYPA *triangularis*, Sowerby; A. *decussata*, Sowerby; A. *desquamata*, Sowerby; A. *squamosa*, Sowerby. These species are limited to the middle section, or the Chemung rocks; and the upper or red sandstone is characterized by remains of HOLOPTYCHIUS *nobilissimus*, a fish, no remains of which have hitherto occurred in the lower or middle Devonian rocks of this country, nor have any shells been found associated with this fish, so that we know not any point of connexion, by either mineral or zoological resemblance, between the middle and upper terms of the Devonian system.

Descriptions of new species of Organic Remains belonging to the Silurian, Devonian, and Carboniferous systems of the United States. By T. A. CONRAD.

AVICULA.

1. AVICULA *perobliqua*. Pl. 12, fig. 1.—Obliquely subovate, with radiating lines, distinct only on the posterior side; dorsal line rectilinear, long and very

oblique; anterior wing short, wide, sinuous, the front margin truncated; posterior wing elongated; basal margin inclining to a regular arch; posterior extremity acutely rounded.

Locality. Hamilton, Madison county, New York. Upper Silurian shale.

A common species, very easily distinguished from others of the genus with which it is associated, by its long, very obliquely ovate outline. Casts of the interior scarcely exhibit any radiation. It is often found with connected valves.

2. *AVICULA angustirostra*.—Obliquely subovate-acute, with prominent radii, alternated in size, and crossed by distant concentric lines; umbo narrow and tapering to the apex, which is prominent and acute.

Locality. Near Middleburg, Schoharie county, New York. Same rock with the preceding.

The description is drawn from a lower valve. The ears are imperfect, and the form approaches that of the preceding species, but it tapers more towards the apex; it is also more ventricose towards the anterior margin, and the radii fewer and larger.

3. *AVICULA subquadrans*. Pl. 12, fig. 2.—Sub-rhomboidal, with concentric wrinkles, most distinct towards the apex; anterior wing wide, the front margin truncated; posterior wing narrow, the extremity obtusely angulated, uniting with the poste-

rior margin, which is obliquely truncated or slightly emarginate.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

4. *AVICULA spinigera*. Pl. 12, fig. 3.—Oblique, with concentric wrinkles; anterior wing short, wide, obtuse; posterior wing suddenly ending in a slender spiniform prolongation; dorsal margin carinated; apex rather obtuse, and above the hinge line.

Locality. Chemung Narrows, New York. Devonian shale.

This small *AVICULA* is associated in great numbers in a portion of the Devonian shale, but generally the slender spiniform portion of the posterior wing is hardly visible, being imbedded in the rock, or broken off by fracture of the specimen. It does not occur in Silurian strata.

5. *AVICULA Boydi*. Pl. 12, fig. 4.—Subrhomboidal, compressed, lower valve with numerous radii, disposed to be interrupted by concentric lines, which are fimbriated, or have numerous angular indentations; anterior wing short, sinuous, truncated; posterior wing ample; posterior extremity of the valves acutely rounded.

Locality. Hamilton, Madison county, New York. Upper Silurian shale.

Named to commemorate the zeal and geological investigations of the late Dr. George W. Boyd,

of New York, who died in Virginia, while exploring the rocks of that State, in connection with the geological survey under Professor Wm. B. Rogers.

6. *AVICULA erecta*. Pl. 12, fig. 5.—Direct; independent of the wings, of an ovate-acute outline; left valve ventricose, concentrically wrinkled or marked with lines of growth; apex prominent, narrow, acutely rounded; posterior wing elongated, pointed; basal margin uniting with the lateral margins in a regular curve or arch.

Locality. Occurs with the preceding species.

7. *AVICULA protexta*. Pl. 12, fig. 6.—Lower valve obliquely produced, concentrically wrinkled; hinge line shorter than the length of the shell; margin of the wing obliquely truncated.

Locality. Chemung Narrows, New York. Devonian shale.

Allied to *A. damnoniensis*, Sow., but differs in being destitute of radiating lines.

8. *AVICULA æsopus*. Pl. 12, fig. 7.—Subrhomboidal, compressed; marked with simple lines of growth; anterior wing very short, angulated at the extremity; anterior margin truncated; posterior margin obliquely truncated; posterior wing obscurely defined.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

9. *AVICULA flabella*. Pl. 12, fig. 8.—Lower

valve with from six to eight distant costæ, each interval with three or four longitudinal striæ, between each two of which is a minute line; anterior wing wide, obtuse, obliquely costated; posterior wing dilated, marked with radiating striæ of unequal size; extremity angular, and nearly on a line with the posterior extremity of the shell; valves with numerous concentric wrinkles, most conspicuous on the posterior wing.

Localities. Hamilton, Madison county: near Middleburg, Schoharie county, New York. Upper Silurian shale.

A very common and characteristic fossil, limited to the shales of Cazanovia, Hamilton, Middleburg, &c. I never met with it in the overlying shales at Sherburne, Smyrna, &c.

10. *AVICULA parilis*. Pl. 12, fig. 9.—Upper valve flat; lower valve plano-convex; surface with numerous, equal, filiform, prominent radii; wings angulated at tip, the anterior one most acute, and nearly equal in length to the posterior wing; apex not elevated above the hinge line; anterior, posterior, and basal margins forming an uninterrupted arched or rounded outline.

Locality. Cazanovia, Madison county, New York. Upper Silurian shale.

A beautiful and common species, the larger valve much resembling a *Pecten*.

The *MONOTIS princeps*, of the Geological Reports of New York, is probably the same shell.

The flat valve is represented on the plate.

11. *AVICULA Trentonensis*. Pl. 12, fig. 10.—Right valve: very oblique, ventricose, somewhat elliptical in outline; obscurely radiated; anterior side with an oblique depression; anterior extremity acutely angular; posterior end rounded, extending much beyond the line of the posterior wing.

Locality. Near Middleville, Herkimer county, New York. Trenton limestone; (Lower Silurian.)

12. *AVICULA naviformis*. Pl. 12, fig. 11.—Lower valve: subrhomboidal, slightly ventricose, obscurely radiated; summit of umbo much above the cardinal line; anterior wing triangular; posterior wing elongated; angulated at the extremity, which extends beyond the line of the posterior extremity of the valve; umbonial slope rounded, not suddenly depressed, except on the umbo.

Locality. Schoharie, New York. In middle Silurian limestone.

This *Avicula* is eminently characteristic of the limestone known as the Pentamerus limestone of Schoharie and the Helderberg, and occurs in the Wenlock limestone of Dudley.

13. *AVICULA trilobata*. Pl. 12, fig. 13.—Small, subovate; lower valve ventricose, obscurely radiated, with the posterior margin of the wing and of the valves rounded; anterior wing obtuse.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

14. *AVICULA pecteniformis*. Pl. 12, fig. 14.—Sub-

ovate; lower valve convex-depressed, with about 35 prominent, filiform, acute radii, with an intermediate fine line; posterior wing acutely angulated; beak on a level with the hinge line.

Locality. Schoharie, New York, in Onondaga limestone, (Upper Silurian strata.)

15. *AVICULA emacerata*. Pl. 12, fig. 15.—Much compressed; lower valve plano-convex, wider than high, with numerous fine, equal radii; summit of umbo a little above the cardinal line; posterior wing acutely angular at the extremity, which is nearly on a line with the rounded posterior end of the valve; anterior wing very short, triangular.

Locality. Lockport, New York. Middle Silurian or Niagara shale.

Allied to *A. Boydii*, but is proportionally wider, flatter, more regularly rounded at base, &c.

16. *AVICULA manticula*. Pl. 12, fig. 18.—Obliquely ovate-acute; anterior wing short and triangular; lower valve with unequal, prominent, rather distinct radii; umbo narrow, tapering to the summit, which is elevated above the cardinal line; basal margin rounded or arched.

Locality. Schoharie, in Pentamerus limestone. (Middle Silurian.)

17. *AVICULA multilineata*. Pl. 13, fig. 1.—Subrhomboidal; lower valve with numerous equal, filiform radii; anterior wing triangular, produced, acute; posterior wing angular, shorter than the

width of the shell ; densely striated ; the extremity angulated ; summit of umbo somewhat elevated above the hinge line.

Locality. Chemung Narrows, New York. Devonian shale.

18. *AVICULA pleuroptera*. Pl. 13, fig. 2.—Lower valve. Subovate, ventricose, with obsolete radii ; summit of umbo above the cardinal line ; anterior wing very short ; the posterior wing produced, rostrated, acute, with an oblique rib or carina on the posterior half, extending to the acutely angulated extremity.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

19. *AVICULA demissa*. Pl. 13, fig. 3.—Elevated ; inferior valve plano-convex, concentrically wrinkled, and occasionally slightly furrowed ; anterior wing triangular, the upper margin on a line with that of the posterior wing, which is extended beyond the line of the posterior extremity ; beneath the wing the posterior margin is nearly straight, and but slightly oblique ; upper valve flat, and concentrically furrowed with wide, shallow, concave grooves ; summit of umbo on a level with the hinge line.

Locality. Near Rome, Oneida county, New York. Lower Silurian sandstone.

20. *AVICULA subfalcata*. Pl. 13, fig. 4.—Subfalcate ; lower valve ventricose, with well defined

radii and transverse wrinkles; the upper valve convex, with concentric wrinkled striæ; posterior extremity beyond the line of the wing.

Locality. Hamilton, Madison county, New York. Upper Silurian shale.

21. *AVICULA quadrula*. Pl. 13, fig. 5.—Subquadrate; length and width equal, compressed; lower valve plano-convex, with distinct radii of equal size crossed by concentric lines; posterior wing rather shorter than the width of the shell; anterior wing triangular, beneath which the margin is direct before rounding to the base.

Locality. Cazanovia, Madison county, New York. Same rock with the preceding.

22. *AVICULA Chemungensis*.—Lower valve: plano-convex, subquadrate, with prominent radii, about 34 in number, which become obsolete and undulated towards the base; anterior wing with the extremity nearly on a line with the end margin of the valve; posterior wing wide, rather shorter than the width of the valve, profoundly radiated with prominent striæ. Length two and a quarter inches; width two and a half inches.

Locality. Chemung Narrows, New York. Devonian shale.

23. *AVICULA aviformis*. Pl. 13, fig. 11.—Obliquely ovate; lower valve concentrically sulcated; anterior wing small, triangular; apex prominent;

posterior margin obliquely truncated; extremity subangulated; anterior side narrowed.

Locality. Cold Spring, Montgomery county, New York. Lower Silurian shale.

CYPRICARDITES.

1. *CYPRICARDITES indenta*. Pl. 12, fig. 12.—Subovate; ventricose posteriorly, with distant impressed, concentric lines, and obsoletely radiated on the posterior side; anterior side with a wide, not profound, sinus or furrow; posterior extremity greatly above the line of the base, and acutely rounded; basal margin slightly contracted anteriorly, and swelling on the posterior side.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

2. *CYPRICARDITES truncata*. Pl. 12, fig. 17.—Trapezoidal, with concentric furrows; umbonial slope slightly incurved and sharply carinated; hinge margin slightly recurved; posterior margin obliquely truncated.

Locality. Occurs with the preceding.

3. *CYPRICARDITES corrugata*. Pl. 13, fig. 6.—Shell elongated; dorsal and basal margins nearly parallel; surface with longitudinal irregular costæ, terminating at the umbonial slope which is defined by an obtuse carinated line; posterior slope with radiating striæ; posterior extremity obliquely truncated; dorsal margin slightly recurved.

Locality. Occurs with the preceding.

4. *CYPRICARDITES sectifrons*. Pl. 13, fig. 8.—Subovate, compressed, with fine obsolete radiating lines; hinge margin elevated, straight; anterior side with an oblique narrow groove or fold; posterior margin obliquely truncated above, the extremity rounded; basal margin straight in the middle; umbonial slope with a rather wide obsolete furrow, extending the whole length.

Locality. Cazenovia, Madison county, New York. Upper Silurian shale.

5. *CYPRICARDITES carinifera*. Pl. 13, fig. 14.—Trapezoidal; disk flattened, concentrically striated; anterior side very short; posterior margin obliquely truncated, the extremity acute; dorsal margin slightly declining, rounded posteriorly; umbonial slope profoundly carinated; basal margin straight; posterior slope profoundly depressed.

Locality. Chemung Narrows, New York. Devonian shale.

6. *CYPRICARDITES recurva*. Pl. 13, fig. 18.—Elongated, recurved, concentrically furrowed anteriorly, striated posteriorly; valves with very minute radiating lines anterior to the umbonial slope, and obliquely and deeply contracted from beak to base; umbonial slope angulated above, rounded and undefined towards the base; posterior margin obliquely truncated above, rounded at the extremity; basal margin sinuous; summit of umbo elevated.

Localities. Cazenovia, Madison county: near

Smyrna, Chenango county, New York. Upper Silurian shales.

7. *CYPRICARDITES inflata*. Pl. 15, fig. 2.—Obliquely ovate, inflated, with concentric distant grooves, forming imbricated flat ridges; anterior side very short, truncated, slightly contracted from beak to base.

Locality. Munsville, Oneida county, New York. Onondaga limestone. Upper Silurian.

INOCERAMUS.

1 *INOCERAMUS oviformis*. Pl. 13, fig. 7.—Obliquely ovate-acute, convex, tapering towards the apex; anterior margin descending straight and nearly direct from the apex to the middle of the valve; dorsal margin very oblique, and with a slight wing; base regularly rounded.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

2. *INOCERAMUS Chemungensis*. Pl. 13, fig. 9.—Profoundly elevated, compressed; dorsal margin very oblique, slightly arched; anterior and posterior margins parallel; anterior margin straight, or very slightly concave from beak to base; the submargin profoundly depressed; apex acute.

Locality. Chemung Narrows, New York. Devonian shale.

3. *INOCERAMUS Mytilimeris*. Pl. 13, fig. 10.—Obliquely ovate, slightly ventricose; anterior mar-

gin direct, slightly concave; posterior and dorsal margins arched; apex acute, prominent.

Locality. Helderberg mountain; and near Schoharie, New York. Middle Silurian shale.

MICRODON, Conrad.

Shell bivalve, equivalve; hinge with a slender oblique tooth in the left valve. The genera of many of the bivalves of the Palæozoic rocks are very little known. Casts of the hinge and teeth are rare, and the external form, though it sometimes may afford a clue to the generic relations of a bivalve, is often useless for that purpose. In the present instance a provisional generic name is given, because I cannot refer the shell to any published genus; but I must acknowledge that the casts of the hinge and teeth, which I have yet seen, are not very clear or satisfactory.

MICRODON bellastrata. Pl. 13, fig. 12.—Much compressed, with very regular, equal, concentric striæ; hinge margin slightly [declining and nearly straight; posterior margin wide, direct; a slight fold anterior to, and parallel with, the umbonial slope.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

NUCULITES.

1. *NUCULITES Chemungensis.* Pl. 13, fig. 13.—Rhomboidal, convex; anterior margin direct above;

obliquely truncated inwards inferiorly; apex prominent; posterior depression abrupt; posterior margin oblique, slightly emarginate or contracted, extremity subangulated; hinge margin nearly straight, slightly declining.

Locality. Chemung Narrows Devonian shale.

2. *N. radiata*. Pl. 12, fig. 16.—Subovate convex-depressed, with prominent radii, except near the extremities; rays about 12 in number; anterior side concentrically sulcated; hinge margin declining, straight; posterior margin obliquely truncated; umbonial slope slightly prominent; posterior depression angular, with a medial slightly raised line.

Locality. Near Sherburne, Chenango county, New York. Upper Silurian shale.

3. *N. concentrica*. Pl. 15, fig. 19.—Subtrian-gular, slightly ventricose, with rather distant sharp concentric striæ; umbonial slope obtusely angulated; posterior dorsal margin rectilinear, very oblique; posterior extremity truncated, the margin nearly direct; beaks near the anterior extremity; basal margin nearly straight in the middle.

Locality. Inclined plane of the Alleghany mountain; No. 3, in bituminous shale overlying coal. (Carboniferous system.)

4. *N. appressa*. Pl. 15, fig. 4.—Subrhomboidal, much compressed; anterior and basal margins regularly rounded or arched; posterior margin widely truncated, extremity angular; umbonial slope angular on the umbo, undefined below; beaks

about one-third the length of the shell from the anterior extremity; dorsal margin slightly oblique, extremity rounded.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

5. *N. subemarginata*. Pl. 15, fig. 5.—Oblong-oval, slightly ventricose; beaks not central, but very distant from the anterior extremity; dorsal margin arched to the angular extremity, beneath which is a slight emargination directed inwards; basal margin subrectilinear; anterior margin regularly rounded.

Locality. Near Waterville, Oneida county, New York. Upper Silurian shale.

6. *N. constricta*. Pl. 15, fig. 8.—Subovate, compressed, with concentric lines which suddenly become obsolete on the margin of an oblique furrow which extends from the beak to the base of the posterior side; beaks near the anterior extremity, which is acutely rounded; basal margin arched anteriorly, contracted on the posterior side; posterior extremity rounded, and much above the line of the base.

Locality. Near Moravia, Cayuga county, N. Y.

7. *N. mactroides*. Pl. 15, fig. 6.—Triangular, convex, with fine concentric lines; anterior dorsal margin very oblique, rectilinear; posterior dorsal margins lightly arched, very oblique, extremity angular; a submarginal furrow on the posterior slope;

beaks rather prominent and acute, remote from the anterior extremity; anterior margin rounded; basal margin regularly and profoundly arched.

Locality. Moscow, Hillsdale county, Michigan. Dr. Houghton. Carboniferous system.

8. *N. sulcatina*. Pl. 15, fig. 10.—Triangular; posterior side cuneiform; valves with concentric striæ and a few remote furrows; posterior dorsal margin subrectilinear, very oblique, extremity acutely rounded; basal margin slightly emarginate near the anterior extremity, which is acutely rounded; beaks distant from the anterior extremity, prominent.

Locality. Occurs with the preceding species.

9. *N. filosa*. Pl. 15, fig. 7.—Subovate, slightly ventricose, with fine sharp concentric lines, most distinct on the posterior side, and profound on the submargin of the dorsal line, which is subrectilinear and very oblique, extremity obtusely angular, and much above the line of the base; anterior extremity subtruncated; basal margin profoundly arched.

Locality. Ithica. Devonian shale.

10. *N. lirata*. Pl. 15, fig. 14.—Triangular, with concentric wide angular furrows, forming angular intermediate ridges; beak prominent, acute, near the anterior extremity, which is truncated; posterior side cuneiform, extremity acutely rounded.

Locality. Near Waterville, Oneida county, New York. Upper Silurian shale.

11. *N. alta*. Pl. 15, fig. 15.—Obliquely sub-oval, convex, with concentric lines; beak elevated, acute, posterior dorsal margin not oblique, very short; posterior margin obliquely truncated; anterior basal margin nearly parallel with the posterior margin.

Locality. Ogden's Ferry, N. Y.

12. *N. multilineata*. Pl. 15. 9.—Subovate, compressed, with numerous fine concentric striæ; beak not prominent; posterior basal margin slightly emarginate or truncated obliquely inwards, extremity acutely rounded.

Locality. Moscow, Livingston county, in the lower beds of shale. Upper Silurian.

PTERINEA.

1. *PTERINEA planulata*. Pl. 13, fig. 15.—Subovate, with angular concentric sulci; valves flattened, swelling slightly over the umbonial slope which is rounded, with a depressed line on its posterior margin; hinge margin elevated; much shorter than the length of the shell; summit not prominent; anterior margin very obliquely truncated; posterior extremity acutely rounded.

Locality. Helderberg mountain. Lower rock of the upper Silurian series. Grit slate of Eaton.

2. *P. pygmæa*. Pl. 13, fig. 16.—Subovate, ventricose; basal margin swelling posterior to the middle; hinge line nearly straight, acutely round-

ed at the extremity; posterior margin obliquely truncated inwards.

Locality. Flint creek, Ontario county, New York. Upper Silurian shale.

3. *P. radians*. Pl. 15. fig. 1.—Suboval, with numerous convex ribs; beak very prominent, central; anterior dorsal margin elevated, straight; anterior margin widely arched, angulated above.

Locality. Cazenovia, Madison county, N. Y.

PLEURORHYNCHUS.

1. *PLEURORHYNCHUS crassifrons*. Pl. 13, fig. 17.—Rostrum very thick, entire; sides with radiating lines forming convex, slightly prominent ribs, five or six in number; posterior depression with obsolete radiating lines; posterior wing small, triangular, little prominent.

Locality. Cazanovia, Madison county, New York. Upper Silurian shale.

This rare species, as represented in the figure, is probably pressed out of its original shape. I have seen only two or three casts, of which the one represented is the only specimen nearly entire.

The genus *Phurorhynchus* is probably identical with *Pterinea* of Goldfuss; the figure of *PTERINEA trigona* in the "Petrefacten" of that author having the form of *Phurorhynchus*, and the peculiar Avicula-like hinge of *Pterinea*.

2. *P. attenuatus*. Aliform, anteriorly produced,

attenuated to an acute angle; ribs twenty-nine or thirty, slender and about as wide as the intervening spaces on the ventricose disk, but broader and flattened on the compressed rostrum; umbonial slope acutely angulated; posterior slope profoundly depressed, or concave.

Locality. Schoharie, in grit of the Lower Ludlow age. Upper Silurian.

In enumerating the ribs of this species, those of the posterior slope are not included.

3. *P. vomer*. Subtriangular; profoundly ventricose; anterior side produced; obliquely subtruncated at the extremity? ribs about twenty-three in number from the anterior end to the umbonial slope; ribs widest on the anterior side; posterior slope very oblique and nearly at right angles with the disk.

Locality. Pendleton, Ohio. Silurian.

This is a cast, and much resembles the preceding species, but although imperfect at the anterior end, it appears to have not been attenuated in the same degree; the ribs are fewer in number and the posterior slope more oblique.

STROPHOMENA, Raf.

1. *STROPHOMENA syrtalis*. Pl. 14, fig. 1.—Semi-orbicular; with a sharp radiating striæ, bifurcating towards the base; inferior valve convex; the superior, flat; extremity of hinge line forming a right angle with the lateral margin; basal margin regularly arched.

Locality. Near Hamilton, Madison county, New York. Upper Silurian shale.

Very abundant in a particular thin stratum of the formation. Young specimens, when perfect, exhibit minutely tuberculated ribs.

2. *S. inæquistriata*. Pl. 14, fig. 2.—Semiorbicular, with sharp radii alternated in size; lower valve ventricose below the middle, and rather abruptly bent or rounded; upper half of the valve flattened or convex-depressed; hinge line slightly produced or salient at the extremities.

Locality. Moscow, Livingston county, New York. Upper Silurian shale.

3. *S. crebristriata*. Pl. 14, fig. 3.—Semiorbicular, with fine crowded bifurcating radii; inferior valve ventricose, slightly depressed or flattened in the middle; sides depressed or concave towards the hinge margin, the extremities of which are slightly salient and not very acute; summit of umbo elevated above the hinge line.

Locality. Near Schoharie, New York. Upper Silurian or Onondaga limestone, and underlying grit. The figure represents a specimen from the former rock.

4. *S. camerata*. Pl. 14, fig. 5.—Subtriangular; inferior valve profoundly ventricose, or gibbous in the middle, with minute crowded unequal radii; umbo convex-depressed; apex nearly on a line with the hinge margin; sides depressed towards the

cardinal line ; the extremities of which are slightly salient.

Found by Mr. Vanuxem, in Trenton limestone. Lower Silurian.

5. *S. varistriata*. Pl. 14, fig. 6.—Semiorbicular; lower valve ventricose, slightly bent or suddenly rounded towards the base, with prominent sharp radii, alternated in size, and the intervening spaces with minute longitudinal lines; umbo narrowed and convex; sides towards the hinge flattened; apex slightly prominent.

Locality. Near Schoharie, New York. In Pentamerus limestone. Middle Silurian.

6. *S. rectilateris*. Pl. 14, fig. 7.—Semioval; lower valve ventricose, with sharp crowded fine radii, alternated in size; disk from beak to base regularly arched or convex; hinge extremities very little salient, angular; lateral margins obliquely subrectilinear; apex prominent.

Locality. Near Schoharie, in the same rock with the preceding species.

7. *S. impressa*.—Semiorbicular, or semioval; inferior valve ventricose or acutely rounded in the middle; umbo convex-depressed; apex on a line with the hinge margin; radii fine, crowded unequal; on the lower half becoming distinct impressed lines, with intermediate very minute raised radiating lines.

Locality. Schoharie, New York. In same rock with the two preceding species. Found by John Gebhard, jr.

8. *S. corrugata*. Pl. 14, fig. 8.—Semiorbicular, nearly flat; radii prominent, with a minute intermediate line, and towards the lateral margins, the spaces between the larger striæ have three lines, the middle one largest; oblique strong plicæ margin the hinge line.

Locality. Near Rochester, in Green shale. Lower Silurian. Found by Mr. James Hall.

9. *S. lachrymosa*. Pl. 14, fig. 9.—Lower valve ventricose, depressed towards the hinge extremities; disk slightly flattened in the middle, marked with numerous elongated tubercles arranged in radii which profoundly bifurcate; hinge line not salient at the extremities, angulated, submargin with prominent tubercles; umbo ventricose; summit above the cardinal line.

Locality. Chemung Narrows, New York. Devonian shale.

Resembles *S. laxispina*? Phillips, Palæozoic Fossils, fig. 99, and *LEPTÆNA fragaria*, var. Sowerby, in Geol. Trans., vol. 5, pl. 54, fig. 3.

10. *S. lima*.—Semiorbicular; lower valve ventricose, depressed in the middle, most profound towards the base; surface with very numerous elliptical tubercles disposed somewhat in quincunx order; umbo ventricose; superior lateral spaces much depressed.

Locality. Occurs with the preceding species.

Differs from the last in the depressed middle, much more numerous, shorter tubercles, &c. The size is nearly the same.

11. *S. mucronata*. Pl. 14, fig. 10.—Winged; inferior valve convex-depressed, with crowded unequal radii, and very fine transverse wrinkles; umbo flattened, apex on a line with the hinge margin; hinge extremities acutely angulated.

Locality. Occurs with the preceding species.

12. *S. perplana*. Pl. 14, fig. 11.—Semiorbicular; inferior valve plano-convex, with crowded minute equal radii, and somewhat rugose concentrically towards the apex, which is on a line with the hinge margin; hinge extremities slightly salient; lateral margins direct.

Locality. Schoharie, New York. In Onondaga limestone. Upper Silurian.

13. *S. Chemungensis*. Pl. 14, fig. 12.—Semiorbicular, inferior valve ventricose; superior valve slightly concave, with a prominent umbo; radii very numerous, prominent, subequal; umbo of inferior valve ventricose, summit not prominent; hinge angles nearly rectangular; margins extending in a very regular curve from the cardinal extremities.

Locality. Chemung Narrows, New York. Devonian shale.

14. *S. carinata*. Pl. 14, fig. 13.—Wider than long, suboval; cardinal extremities slightly salient; inferior valve slightly depressed or flattened in the middle; radii distinct, crowded, equally prominent, bifurcating; summit of umbo slightly elevated; dorsal margin with short spines or acute tubercles.

Locality. Moscow, Livingston county, New York. Upper Silurian shale.

15. *S. demissa*. Pl. 14, fig. 14.—Length and width nearly equal; inferior valve ventricose; superior valve deeply concave; radii sharp, prominent, subtuberculated, much more prominent on the upper than on the lower half of the valves, where they greatly bifurcate and become fine and very numerous; umbo convex, the summit slightly elevated; hinge angles slightly salient.

Locality. Shore of lake Erie, Erie county, New York. Upper Silurian shale.

16. *S. delthyris*. Pl. 14, fig. 19.—Subtriangular; narrowed towards the base; superior valve slightly concave; radii very numerous, subequal.

Locality. Chemung Narrows, New York. Devonian shale.

This shell approximates *ORTHIS arachnoidea*, Phillips, in "Palæozoic Fossils," fig. 114, and is probably the same species, but it is different from the mountain limestone species of the same name. I have seen but one valve of this shell.

17. *S. subplana*.—Semioval, with sharp radii alternated in size, larger and more distinct near the hinge line; superior valve slightly concave, with a plano-convex umbo; hinge line elevated above that of the opposite valve; area oblique; extremities of hinge line slightly salient. Length one inch and one eighth; length of hinge line one and a half inches; width of the shell one inch and three-eighths.

Locality. Lockport, in Niagara shale. Middle Silurian.

18. *S. phuristriata*.—Semioval, inferior moderately convex, with crowded very fine regular striæ minutely wrinkled transversely and bifurcating towards the base; hinge extremities slightly salient and acute; lateral margins direct; basal margin rather obtusely rounded. Length one inch; width one inch and one-fourth.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

The description is from an impression of the inferior valve.

19. *S. tenuilineata*.—Semioblong-oval, with minute crowded radiating lines; cardinal extremities slightly salient and angulated; one valve slightly convex, the other flat.

Occurs in Trenton limestone. Lower Silurian.

Distinguishable from its congeners of the Trenton limestone by the slight convexity of the inferior valve, and the extreme fineness of the radiating lines. The outline is also different, being wider towards the base than in any other Trenton species.

It resembles *ORTHIS compressa*, Sowerby, except in outline, being much longer in proportion to the width.

20. *S. elongata*.—Semielliptical; inferior valve plano-convex, with minute, equal, crowded radiating lines; hinge line about equal in length to the width of the shell; margins gradually narrowed

towards the base, which is rather acutely rounded ; apex very slightly prominent above the hinge line. Length nearly one inch and one-fourth.

Locality. Schoharie, in *Pentamerus* limestone. Middle Silurian.

21. *S. nasuta*. Triangular; longer than wide, slightly winged; inferior valve with the umbo and disk flattened; towards the base, suddenly and concentrically bent towards the upper valve; concentrically wrinkled; radii distinct, rather remote, with three or four minute intermediate lines; base projecting and angular in the middle.

Locality. Near Rome, Oneida county, N. Y.

This species resembles *S. alternata*, and *S. Deltoidea* in having one or two of the central lines larger than the rest, but it is a much flatter and proportionally longer shell.

DELTHYRIS.

1. *DELTHYRIS acutilirata*. Pl. 14, fig. 15.—Ventricose, with about thirty-two sharp, very prominent ribs, and four larger costæ on the mesial fold of the upper valve, which is elevated, flattened at the sides, and convex on the back; hinge extremity winged and acute; inferior mesial fold very profound; beaks nearly equally prominent; cardinal area moderate, widest on the inferior valve, profoundly impressed or obliquely inclined.

Locality. Falls of the Ohio river, Kentucky. Silurian shale.

2. *D. duplicata*. Pl. 14, fig. 16.—Semiorbicular; superior valve slightly ventricose, with about thirty-two angulated ribs; hinge extremities slightly salient; mesial fold prominent, flattened on the back, expanded towards the base, and divided throughout by a longitudinal sulcus.

Locality. Near Smyrna, Chenango county, N. Y. Upper Silurian shale.

3. *D. bialveata*. Pl. 14, fig. 17.—Superior valve laterally produced, with minute crowded radiating lines; sides flattened; mesial fold moderately elevated, convex, margined by a sulcus which is abruptly depressed.

Locality. Lockport, N. Y. Middle Silurian; in Niagara shale.

4. *D. rugatina*. Triangular; superior valve with very minute regular concentric wrinkles; mesial fold elevated, moderately wide, wrinkled across, margined by a sulcus, suddenly depressed on the margin of the fold; hinge extremities rounded. Width half an inch.

Locality. Occurs with the preceding species.

5. *D. Niagaraensis*. Suboval; ventricose in the middle; ribs about thirty-two, not very prominent, rounded, finely striated longitudinally; mesial fold of the upper valve convex, longitudinally striated, margined by a deep sulcus; hinge line shorter than the width of the shell, rounded at the extremities. Width one and a half inches.

Locality. Occurs with the preceding.

6. *D. raricosta*. Pl. 14, fig. 18.—Suborbicular, ventricose, with about six large elevated subangular ribs; superior valve with the mesial fold flattened on the back; angulated at the sides; summit of the inferior valve elevated much above that of the opposite valve; cardinal area wide, very oblique; mesial fold profound; hinge line shorter than the width of the shell.

Locality. Near Schoharie; Split-rock Quarry, Oneida county, New York, in Onondaga limestone. Upper Silurian.

7. *D. varica*. Pl. 14, fig. 20.—Bilobate, triangular; with radiating unequal striæ; middle of each valve with a profound angular sulcus; hinge line very short; base profoundly emarginate, angular in the middle.

Locality. Helderberg mountain, New York. Middle Silurian limestone.

This shell much resembles the *SPIRIFER cardiospermiformis* of Hisinger, and more nearly the *S. sinuata* of Sowerby, from which it differs in the shorter hinge line, greater proportional width of the valves and deeper mesial sulcus. The outline represents the usual size.

8. *D. audacula*. Triangular; hinge line nearly twice as long as the shell; area wide; ribs about fifty, subangulated; fold of the upper valve profound, slightly flattened on the back, wrinkled across; hinge extremities angular, extending beyond the lateral margins. Length one inch; width rather more than one inch and three-fourths.

Localities. Moscow, Livingston county, and shore of lake Erie, Erie county, New York. Upper Silurian shale.

9. *D. Chemungensis*.—Triangular, ventricose, with numerous slender ribs; upper valve with the mesial fold wide, convex or rounded and ribbed like the sides, except that the ribs bifurcate; about thirteen in number; area of inferior valve very wide; mesial fold profound. Length one inch; width one inch and a half.

Locality. Chemung Narrows, New York. In Devonian shale.

10. *D. fimbriata*.—Transversely subelliptical; inferior valve with about twelve convex, not very prominent ribs, and distant concentric subimbricated lines; surface with short longitudinal striæ arranged in concentric bands; apex very prominent above the hinge line; mesial fold deep and regularly concave. Width three-fourths of an inch.

Locality. Near Saugerties, Ulster county; in Oriskany sandstone: Tinkers' Falls, Courtland county; in Moscow shale.

11. *D. prora*.—Upper valve. Trigonal, profoundly ventricose; ribs double, not very prominent, eighteen or twenty in number; mesial fold profoundly prominent and acutely angular; hinge line shorter than the width of the shell. Length one inch and five-eighths; width two and a half inches.

Occurs in New York in the same rock with the shales at Cazenovia. Upper Silurian. A species

very remarkable for its carinated much projecting fold. It is a cast in sandstone.

12. *D. acanthoptera*.—Lower valve (cast) ventricose; ribs fourteen or fifteen on each side of the mesial fold, flattened, not elevated, obscurely sulcated in the middle; fold profound, wide, regularly concave; hinge extremities suddenly produced into short acutely angular wings. Length one inch and a half; width two inches and five-eighths.

Locality. Oneonta, Otsego county, New York. In the same rock with the preceding.

ORTHIS.

ORTHIS umbonata. Pl. 14, fig. 4.—Subtriangular; superior valve concave, with a convex umbo; inferior valve profoundly ventricose, smooth with a narrow longitudinal sulcus; umbo profoundly elevated; hinge line longer than the width of the shell.

Locality. Moscow, Livingston county, New York. Upper Silurian shale.

ATRYPA.

1. *ATRYPA capax*. Pl. 14, fig. 21.—Profoundly ventricose, with about twelve angular prominent ribs, transversely wrinkled, and four ribs on the mesial fold of the upper valve, which is wide, not profoundly elevated; inferior valve with a profound mesial fold, and very prominent ribs; greatest depth of the two valves nearly equal.

Locality. Richmond, Indiana, in Silurian shale.

2. *A. rectiplicata*.—Triangular, with minute radiating lines; superior valve with a rectilinear fold, profoundly elevated at base, and divided by a longitudinal sulcus, not very profound; sides profoundly rounded or arched towards the base; inferior valve with a sulcus corresponding to the opposite fold; sides concave; umbo convex; lateral margins subcarinated. Length rather more than half an inch.

Locality. Helderberg mountain. In Middle Silurian limestone.

3. *A. nasuta*.—Subfusiform; umbo of inferior valve profoundly ventricose, and the summit greatly elevated above the apex of the upper valve; base with a wide linguiform projection in the middle, profoundly elevated above the basal line at the sides; this fold extends about one-third of the length of the upper valve; on the inferior valve the fold is flattened.

Locality. Schoharie, and Splitrock Quarry, Onondaga county, New York. Upper Silurian or Onondaga limestone.

4. *A. Chemungensis*.—Upper valve suborbicular; profoundly ventricose; minutely radiated with a mesial fold, not much elevated, and acutely rounded; base of the fold emarginate.

Locality. Chemung Narrows, N. Y. Devonian shale.

The mesial fold is obsolete in some specimens.

5. *A. congesta*. Pl. 16. fig. 18.—Subovate; superior valve with a prominent rounded mesial fold, and

a depression on each side widening rapidly towards the base ; inferior valve ventricose, with a profound mesial furrow, and a depression on each side, which causes a prominent acutely rounded rib or carina to margin the furrow or mesial fold.

Length half an inch.

Locality. Medina, N. York, in Clinton group ; Lower Silurian.

6. *A. æquiradiata*. Pl. 16, fig. 17.—Subovate ; both valves ventricose, the inferior valve most profound, obliquely flattened on the sides, prominent and convex on the back ; radii numerous and equal ; summit of umbo in the inferior valve considerably prominent above the opposite beak ; inferior lateral margins obliquely subrectilinear or truncated.

Locality. Near Schoharie, N.Y., in limestone immediately beneath the Oriskany sandstone. Middle Silurian.

LINGULA.

1. *LINGULA Trentonensis*. Pl. 15, fig. 11.—Ovate-acute, convex, sides slightly arching to the apex which is acute ; middle of the base slightly angulated.

Locality. Glenn's Falls, New York, in Trenton limestone.

2. *L. curta*. Pl. 15, fig. 12.—Obtusely ovate, flat, concentrically wrinkled ; apex obtuse ; basal margin arched.

Localities. Near Carlisle, Pennsylvania ; East Canada creek, New York ; in Utica or Lower Silurian shale.

CAMEROCERAS.

Straight, siphuncle marginal; a longitudinal septum forming a roll or involution with the margin of the siphuncle.

This singular genus is confined to the Trenton limestone, (Lower Silurian.) The shell from which the description is taken resembles an *Orthoceras* externally, but is contracted at intervals; the siphuncle is obliquely undulated, and joins the margin.

CAMEROCERAS *Trentonensis*. Pl. 16, fig. 3.

Locality. Near Middleville, Herkimer county, New York.

DIPLOCERAS.

Straight; siphuncle not central nor adjoining the margin; a longitudinal arched septum starting from the margin and dividing the transverse septa.

This genus occurs in the same limestone with the last, and is very distinct. The following species was found by Mr. Vanuxem at Trenton Falls.

DIPLOCERAS *Vanuxemi*. Pl. 16, fig. 2.—Siphuncle large; septa numerous; exterior smooth.

ORTHOCERAS?

Subgenus HYDNOCERAS, Conrad.

O. (HYDNOCERAS) *tuberosum*. Pl. 16, fig. 1.—

Reticulated with strong raised striæ of unequal size; and having 6? longitudinal rows of very large, elevated, distant tubercles, somewhat angulated, or having a carinated line crossing them longitudinally in the middle.

Locality. Found one mile west of Addison, Steuben county, New York, and belongs to the Devonian system. It is a cast in sandstone, and the scientific public is indebted to Dr. James Swaim for the models he has caused to be taken through Mr. Brano from this unique and curious fossil. Until its internal structure shall be known, I propose to place it in a provisional subgenus. No trace of septa is visible, but this is doubtless owing to the cast representing the exterior surface.

GONIATITES.

GONIATITES uniangularis. Pl. 16, fig. 4.—Discoidal; septa, on the sides, of a sigmoidal form, rounding outwards on the margin, and forming an acute angle on the back; back acutely rounded.

Locality. Found by Mr. James Hall in Livingston county, New York. Upper Silurian shale.

BELLEROPHRON.

1. *BELLEROPHRON percarinatus.* Pl. 16, fig. 5.—Subglobose; back with a sharp, elevated, waved carina; sides with distant transverse acute ribs and intermediate minute striæ; volutions concealed.

Locality. Inclined plane of the Alleghany mountain, in black shale overlying the stratum of coal No. 7. Carboniferous system. Found by Dr. James Trimble, of Huntingdon, Pennsylvania.

2. *B. brevilineatus*. Pl. 16, fig. 6.—Discoidal; tapering gradually to a very acute periphery; volutions exposed; from the margin of the umbilicus radiate short lines, less in length than half the width of the large volution.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

3. *B. curvilineatus*. Pl. 16, fig. 7.—Discoidal; volutions exposed; back sharply carinated; surface with oblique arched striæ.

Locality. Schoharie, in Onondaga limestone. Upper Silurian. Found by John Gebhard, Jr.

4. *B. declivis*. Pl. 17, fig. 3.—Discoidal; sides flattened or cuneiform; back angulated; volutions exposed; sides with very oblique arched striæ meeting at an angle on the back.

Locality. Near Carlisle, Pennsylvania. Mr. Baird. Trenton limestone.

This species resembles the preceding, but is wider and much less acute on the back, and the striæ, are more numerous and approximate.

5. *B. stamineus*. Pl. 15, fig. 13.—Subglobose, expanded at the aperture; striæ longitudinal, distinct; back rounded.

Locality. Moscow, Hillsdale county, Michigan. Dr. Houghton. In brown shale of Carboniferous period.

6. *B. perlatus*.—Globose, with fine longitudinal lines; back obtusely carinated; aperture profoundly dilated.

Locality. Inclined plane of Alleghany mountain, No. 3. Carboniferous system.

About the size of the preceding species, but much wider, and more dilated in front.

CYRTOLITES.

CYRTOLITES *Trentonensis*. Pl. 17, fig. 4.—Slender, gradually tapering; back angulated; sides obliquely flattened, angulated nearer to the inner than the outer margin; large whirl with oblique rectilinear striæ.

Locality. Near Carlisle, Pennsylvania, in Trenton limestone. Found by Mr. Baird of Carlisle, and kindly presented by him.

PLEUROTOMARIA.

1. PLEUROTOMARIA *Poulsoni*. Pl. 16, fig. 8.—Elevated; volutions five, with two distant spiral carinated lines on all except the two at the apex; whirls transversely striated.

Found by Charles Poulson, Jr. in Onondaga limestone, in Onondaga county, New York. Upper Silurian.

2. *P. unisulcata*. Pl. 16, fig. 9.—Short-fusiform; spire conical-depressed; upper surface of the large volution slightly concave from the outer margin to a carinated line which borders a transversely rugose sulcus; another, but more obtuse line, margins the suture; penultimate whirl rounded, obtusely carinated at the suture; base nearly rectilinear towards the labrum, slightly convex above the aperture.

Locality. Near Schoharie, in Onondaga limestone. Upper Silurian.

3. *P. bilix*. Pl. 16, fig. 10.—Spire conical; volutions four; sides subrectilinear at base, suddenly contracted at the suture; surface with spiral raised striæ alternated in size; large volution abruptly rounded in its greatest circumference; base flattened and striated.

Locality. Richmond, Indiana, in limestone of the age of the rocks of Salmon river series, New York. Lower Silurian.

This species is the constant associate of *PTERINEA carinata*, in the limestone of the west, termed "Cliff limestone." This species of *Pterinea* is limited in New York to the Salmon river shales, and eminently characterises the formation.

4. *P. capillaria*. Pl. 16, fig. 11.—Turrited; volutions slightly angulated below the middle; with spiral carinated lines, the second and third lines from the suture or the upper part of the volutions more distant from each other than from the adjoin-

ing striæ ; upper part of the volutions very obliquely rectilinear ; surface with equal sharp lines which cross the volutions obliquely.

Locality. Near Smyrna, Chenango county, New York. Upper Silurian shale.

5. *P. sphærulata*. Pl. 16, fig. 12.—Subglobose ; spire convex-conical ; sides of the volutions rectilinear ; suture ornamented with a tuberculated carina ; periphery of the large volutions rather obtusely angular, except towards the aperture, where it is acute ; two obscure spiral lines, one on the margin, the other on the upper submargin of the periphery ; base convex, with a spiral line and slight furrow near the columella ; aperture about half the length of the shell.

Locality. Inclined plane of the Alleghany mountain, in company with *BELLEROPHRON percarinatus*. Carboniferous system.

6. *P. tabulata*. *TURBO tabulata*, nob. Trans. of the Geolog. Soc. of Penna., vol. 1. part 2, page 267, pl. 12, fig. 1.

This shell occurs in the same shale and locality with the preceding species.

7. *P. sulcomarginata*. Pl. 16, fig. 13.—Trochiform ; outer margin of the large volution bicarinated, with an intermediate sulcus ; volutions with two distant spiral lines, and crossed by oblique striæ.

Locality. Pompey Hill, Onondaga county, New York. Upper Silurian shale.

INACHUS.

INACHUS catilloides. Pl. 15, fig. 3.—Discoidal; both sides concave from the outer margin to the centre; all the volutions exposed, transversely wrinkled; large volution carinated on the margins; back obtusely carinated in the middle.

Length three-eighths of an inch.

Locality. Same with *PLEUROTOMARIA tabulata*, described above.

EUOMPHALUS.

EUOMPHALUS expansus.—Discoidal; volutions rapidly expanding; sides straight and oblique; the periphery of the body whirl acutely angular; base flattened; aperture rhomboidal, very large.

Localities. Near Rome, Oneida county, New York. Pendleton, Indiana. I have seen this species only in the state of casts, but its dilated form is very peculiar. It characterises the Salmon river rocks, or middle portion of the Lower Silurian series, and is much larger in the limestone of the west than it is in the sandstone of New York. The largest specimen is more than two inches in its greatest diameter.

LOXONEMA.

LOXONEMA subulata. Pl. 16, fig. 14.—Subulate;

length and width of the volutions of the spire equal, convex.

Locality. Medina, Orleans county, New York. Lower Silurian sandstone.

The specimen described and figured appears to have the shell mineralized, but it exhibits no oblique striæ, except obscure traces on a portion of the body whirl.

TROCHOLITES.

Involute; symmetrical; whirls contiguous; the back of inner volutions rounded, fitting into a corresponding groove; septa convex; siphuncle near the inner margin.

This genus differs from *Lituities* in having a submarginal siphuncle, and in not being extended into a straight or bent prolongation. The aperture is widely different, being of a lunate outline, whilst in *Lituities* it is nearly round.

TROCHOLITES planorbiformis. Pl. 17, fig. 1—Volutions higher than wide, longitudinally striated, and with oblique obtuse, transverse lines, approaching at an angle but rounded on the centre of the back; apex profoundly depressed; back of the large volution flattened; aperture much longer than wide.

Locality. Near Grimsby, Upper Canada, in Salmon river sandstone. This elegant shell was found in a boulder, by Mr. S. Ashmead of this city, and by him presented to the Academy of Natural

Sciences. A specimen was kindly given me by this liberal and enterprising mineralogist.

PLECTOSTYLUS. Conrad.

Shell conoidal; spine prominent; aperture elliptical; labium or pillar-lip reflected, not connected with the body whirl, towards the base deeply sulcated, producing a prominent fold on the inner margin.

PLECTOSTYLUS Hildrethii. Pl. 17, fig. 2.—Subovate; whirls convex; suture profoundly impressed; umbilicus profound.

Locality. Flint Ridge, Ohio. Carboniferous system. Found by Dr. Hildreth, of Marietta.

PLATYOSTOMA, Conrad.

Shell subglobose; spire short; aperture very large, suborbicular, dilated; labrum joining the body whirl at right angles to the axis of the shell.

1. *PLATYOSTOMA ventricosa*. Pl. 17, fig. 5.—Globose; whirls somewhat scalariform or flattened above; lower part of columella prominent; labrum reflected; width and length of aperture nearly equal.

Locality. Near Saugerties, New York, in Oriskany sandstone. Middle Silurian.

2. *P. arenosa*. Pl. 17, fig. 6.—Obliquely ovate-globose; body whirl rapidly widening to the base; aperture longitudinally suboval.

Locality. Near Schoharie, New York; a cast in Oriskany sandstone.

3. *P. lineata*. Pl. 17, fig. 7.—Transversely subovate, with wrinkled reticulated striæ; aperture orbicular; spire depressed, or slightly elevated above the top of the body whirl.

The genus *PLATYOSTOMA* is unknown in the Lower Silurian strata.

CORNULITES.

CORNULITES arcuatus. Pl. 17, fig. 8.—Curved, rapidly attenuated; the base of each ring contracted; the upper edge angular.

Locality. Near Albion, Wayne county, New York. Niagara limestone. Middle Silurian.

This curious fossil is a cast in sparry limestone, and differs from the *C. serpularius*, of the Wenlock limestone of England, in being more rapidly attenuated, in having longer and fewer annulations, which are less cup-shaped. Mr. Francis Markoe, Jr., of Washington, has a specimen in the same limestone, in which mine occurs. The two are extremely alike in size and general character, and are the only ones I have seen.

TRILOBITES.

ASAPHUS.

1. *ASAPHUS corycæus*. Pl. 16, fig. 15.—Subovate; flattened; front margin regularly arched, and with a wide striated depressed border; angles of the buckler produced, the extremities being opposite the eighth articulation of the middle lobe; ribs with each an oblique groove; middle of the buckler convex; eyes semioval; grooves of the tail extending to the margin; submargin of the sides and tail striated longitudinally; tail rounded at the extremity.

Locality. Lockport, in Niagara shale. Middle Silurian.

2. *A. ? Trentonensis*. Pl. 16, fig. 16.—Buckler very ventricose, covered with numerous tubercles of unequal size; front profoundly convex towards the outer margin, without furrows; tail with the middle lobe defined by a deep narrow groove on each side; lateral lobes with a broad entire space towards the extremity of the tail, above which are two distant costal furrows, with a short intermediate costal groove.

Locality. Near Carlisle, in Trenton limestone. Found by Mr. Baird.

CALYMENE.

CALYMENE spinifera.—Among the specimens of Lower Silurian fossils of Missouri, in the collection

of my friend J. N. Nicollet, Esq. I noticed the tail of this curious trilobite, which has on the back of one of the articulations of the middle lobe an erect spine, curved towards the caudal extremity, and more than the third of an inch in length. It is a small species, and I propose the name of *spini-fera* in reference to this curious spine.

C. camerata.—Buckler with three tubercles of very unequal size on each side the middle lobe; side lobes with vaulted plates, which join the upper margins of the middle lobe.

Locality. Schoharie, in the ash colored limestone underneath the Hydraulic limestone. Found by John Gebhard, Jr.

DIPLEURA.

In the table of systems, p. 234, among the characteristic genera of trilobites of the Onondaga system, *Homalonotus* was inadvertently substituted for *Dipleura*. The former is synonymous with *Trimerus*, of Green.

CRINOIDEA.

STEPHANOCRINUS, Conrad.

This singular fossil may be described as having five sides, each of which is depressed and angulated, the angles profoundly carinated; three of the

sides with an oblique carina; three longitudinal articulations only are visible; ambulacra on the upper surface and five in number; from the margin proceed five elevated, angular, spiniform processes; pelvis or base triangular, with a cavity where the column unites with it; canal probably pentangular, and very small.

STEPHANOCRINUS angulatus. Pl. 15, fig. 18.—Surface rugose and tuberculated, ambulacra large, covering the whole summit, which is flattened; coronal processes proceeding from between the ambulacra and carinated on the back.

Locality. Lockport, in Niagara shale. Middle Silurian.

ICTHYOCRINUS, Conrad.

Column round, smooth; canal small and round; scapulæ with the margins of the articulations parallel, and somewhat imbricated.

It is difficult to give a description of this genus from Miller's formula, it is so unlike all the others; but it may be easily recognised by representing it as having costal ridges, bifurcating three times, (each suture more profound towards the mouth,) and having transverse impressed lines or articulations, which are angulated in the middle.

ICTHYOCRINUS lævis. Pl. 15, fig. 16.

Locality. Lockport, New York, in Niagara shale.

There is much resemblance in the markings of

this fossil to the scales of a fish, whence the generic name is derived.

NUCLEOCRINUS, Conrad.

This genus differs from PENTREMITES, Say, in having only one perforation at top, which is central.

NUCLEOCRINUS *elegans*. Pl. 15, fig. 17.

Found by Mr. Hall in the western part of New York, in Upper Silurian shale.

Descriptions of New Species of Quadrupeds inhabiting North America. By J. J. AUDUBON, Esq., and the Rev. JOHN BACHMAN, D. D.

Read October 5, 1841.

GENUS VESPERTILIO.

VESPERTILIO *monticola*. Mountain Bat.

V. Vespertilione subulata brevior; auriculis brevioribus; tragus non excedentibus dimidiam longitudinem auriculæ; colore fulvo.

Mountain Bat. Smaller than Say's Bat, (V. *Subulatus*;) ears shorter; tragus, less than half the length of the ear; color, yellowish brown.

Upper fore-teeth bilobate, ears moderate, naked, erect, rather broad at base; tragus linear, subulate, body small; wings long; tail projecting a line beyond the interfemoral membrane, which is slightly sprinkled with hair above and beneath.

Color. The nose and chin are black; ears light brown; wing membranes dark brown. The whole of the fur of the body, above and beneath, is from the roots, of an uniform yellowish-brown color.

This species differs from Say's Bat, not only in color, but in its much shorter ears and tragus. The size and shape of the tragus we have found an infallible guide in our American Bats: the ears of the present species, when alive, are always erect, whilst those of Say's Bat are folded backwards, like those of the long eared Bats—PLECOTUS.

Dentition.

Incis.	2—2,	Canines,	1—1.
	6		1—1.

Dimensions.

Length of head and body,	1 inch 8 lines.
“ tail,	1 “ 6 “
“ spread,	8 inches 0 “
Height of ear, posteriorly,	3 “
“ tragus,	14 “

N. B. The tragus in Say's Bat is four and a half lines in height. Several specimens of this Bat were obtained during summer, on the mountains of

Virginia, at the Grey Sulphur Springs. They were very uniform in size and color.

VESPERTILIO *Virginianus*. Virginian Bat.

V. vespertilione monticolâ paululum longior, auriculis paululum longioribus magisque acutis; dentibus primoribus maxillæ superioris simplicibus; interfemorali membranâ nudâ; corpore supra fuligineo-fusco; vultus cinereo-fuscato.

Virginian Bat. A little larger than the Mountain Bat; ears a little longer and more pointed; upper fore teeth simple; interfemoral membrane naked; sooty brown above, ash brown beneath.

Dental formula.

$$\begin{array}{ccc} & 2-2, & 1-1. \\ \text{Incisors, } & \frac{\quad}{6} & \text{Canines, } \frac{\quad}{1-1.} \end{array}$$

In size, this species is intermediate between VESPERTILIO *Carolinensis*, and *V. subulatus*. The ear is naked, less rounded, and more pointed than either of the other closely allied species. The tragus is very narrow, linear, and less than half the length of the ear. The tail is enclosed in the interfemoral membrane, except the penultimate joint, which is free. The anterior upper fore teeth, instead of being sub-simple, as in the *V. Carolinensis*, or bilobate, as in *V. subulatus* and *V. montanus*, are simple.

Color. The nose, upper lip and under jaw are

black; wings dark brown. The back is sooty brown; on each shoulder, at the insertion of the wing, there is a circular black spot about four lines in diameter; on the under surface cinerious brown.

Dimensions.

Length of head and body,	2 inches 5 lines.
“ tail,	1 “ 0 “
“ spread,	8 “ 8 “
Height of ear, posteriorly,	4 “
“ tragus,	1 1/2 “

Habitat. Mountains of Virginia.

Remarks.

Say's Bat (*V. subulatus*) has been several times described. It was first observed by Say at the head waters of the Arkansas, within sight of the Rocky Mountains. It was subsequently described by Richardson, who obtained it at the Saskatchewan. It was given by Le Conte, in McMurtrie's translation of Cuvier, under the name of *V. Lucifugus*. Professor Green, in Doughty's Cabinet of Natural History, (vol. 2, fig. 270,) gave a correct description of it under the name of *V. domesticus*. He, however, erred in arranging it in the preface of his description, under Rafinesque's genus *Nycticejus*, to which it does not belong. The last notice of it is found in Cooper's Monograph of *Vespertilio*, in the New York Lyceum of Natural History. This species has a very extensive range.

We obtained it in the widely separated localities of Carolina and Labrador during summer. The *V. Carolinensis* is found in autumn, winter and spring, in Carolina; but appears to migrate northwardly in summer, and is at that season common in the State of New York. The *V. monticola* and *V. Virginianus*, have not been met in Carolina or Georgia, and appear to be Northern or Alpine species, and no doubt exist in the more Northern States. The *V. Carolinensis* may be easily distinguished from the other closely allied species, by the large size of the first upper incisor; the second which succeeds it being so minute as to require the aid of a good magnifier to detect it.

VESPERTILIO *Leibii*.—Leib's Bat.

V. supra fusco-ferrugineus, subtus cinereus, alis auribusque nigris.

Leib's Bat. Ears and wings black; dark yellowish brown above; cinereous beneath.

Description. Anterior upper fore teeth bilobate; head short, nose blunt; ears moderate, broad at base, erect. Tragus linear, nearly half the length of the ear; wings and tail long; the latter extending two lines beyond the interfemoral membrane, which is naked; feet very small; toes short and slender; nails sharp and much curved; hair soft and downy.

Color. The ears, wings and interfemoral membrane are black. The fur on the back is black from the roots to near the extremities, where it is so slightly tipt with light brown as to give it a dark yellow-

ish brown appearance. On the under surface the hairs are plumbeous at the roots, tipped with yellowish white.

Dentition.

	2—2		1—1
Incisors,	—	Canines	—
	6		1—1

Dimensions.

	Inches.	lines.
Length of head and body,	1	7
“ tail,	1	4
“ spread,	7	0
Height of ear posteriorly,	0	2½
“ tragus,	0	1

The specimen from which the above description was taken was politely, and with characteristic liberality, sent to us by Dr. Leib, a member of this Society, who procured it, together with several other species, in Erie county, Michigan.

VESPERTILIO californicus. Californian Bat.

V. fusco lutescens, vellere longo et molli; trago longitudine dimidium auris excedente.

Californian Bat. With long silky hairs; tragus more than half the length of the ear; color light yellowish brown.

Description.—Anterior upper fore teeth bilobate. Head small; nose sharp; ears of moderate size; erect, rather narrow and pointed. Tragus linear, attenuated. Wings of moderate length, which to-

gether with the ears are naked. Interfemoral membrane with a few scattered hairs; feet small; nails slightly hooked. Tail projecting a little beyond the interfemoral membrane.

Color. The pelage, which is unusually long for the size of the body, and very soft and glossy, is, on the upper surface, dark plumbeous from the base, and broadly tipped with light yellowish brown; on the under surface the color is a little darker, owing to the outer extremities of the hairs being more narrowly edged with the prevailing color on the back, exhibiting the darker shades beneath. The ears and tragus are blackish—the nose, chin, wings and interfemoral membrane dark brown.

We have obtained but a single specimen, which was captured at California.

Dentition.

	2—2	1—1
Incisors,	—	Canines, —
	6	1—1

Dimensions.

	Inches.	lines.
Length of head and body,	1	7
“ tail,	1	5
“ spread,	7	6
Height of ear posteriorly,	0	3
“ tragus,	0	2

The genera of Bats have within the last few years been greatly multiplied, in order to include the vast number of new species which have been accumulating in European museums. The last revision we

have seen was by Gray, of the British Museum, who has divided the Bats into forty-eight genera. The four species here described, belong to the genus *Vespertilio*, as now restricted. It is characterised by having four incisors in the upper jaw, in pairs on each side, near the canines, with a large, unoccupied space between them. The only species as yet described in the United States, that can be referred to this genus, are *V. Carolinensis*, *V. noctivagans*, *V. subulatus*, *V. monticola*, and *V. Virginianus*.

GENUS MUSTELA.

The existence of a Brown Weasel in America, which does not become white in winter, has been doubted by some naturalists; and by others, the species has been regarded as the *MUSTELA vulgaris* of Europe. Dr. Harlan, (*Fauna Americana*, p. 61,) under the name of *MUSTELA vulgaris*, does not appear to have described an American species. His description seems intended for the common Weasel of Europe, which we think does not exist in America. Dr. Godman, after giving figures of the Ermine both in winter and summer colors, considered the latter as the species improperly referred to *MUSTELA vulgaris* of Europe; and in accordance with the views of Charles L. Bonaparte, the Ermine was regarded as the only species of American Weasel. Dr. Richardson, (*Fauna Boreali Americana*), under the name of *MUSTELA (PUTORIUS) vulgaris*, has described from specimens obtained by Capt. Bay-

field, on the borders of Lake Superior, and also from others procured by himself at Carleton House, which he regarded as agreeing in all respects with the European species. He concludes, by stating, that this species, like the Ermine, "becomes white in winter." We had an opportunity in the Museum of the Zoological Society of London, of examining the specimens referred to by Dr. Richardson, and of comparing them with *MUSTELA vulgaris*, and were satisfied that the species were distinct; yet, unless he was in error in stating that the American species became white in winter, we are not certain that the species we are about to describe, is identical with the specimens referred to by him.

MUSTELA fusca. American Brown Weasel.

M. Corpore inter Mustelam erminiam et Mustelam vulgarem intermedio; candâ illius brevior, sed hujus longior; apice nigro; vellere supra fuscô; subtus albo.

American Brown Weasel. Intermediate in size between *MUSTELA erminia* and *MUSTELA vulgaris*; tail shorter than the former, but longer than the latter, with the extremity black; brown above, white beneath.

The body is long and slender, but far more robust than that of *MUSTELA vulgaris*; the feet especially appear one-third larger, and more thickly clothed with fur, which completely covers the nails. The ear is a little longer, and more pointed, than that of either the Ermine or common Weasel. The white on the lower surface is not mixed with brown hairs, as in the *MUSTELA vulgaris*, and not only oc-

cupies a broader space on the belly, but extends along the inner surface of the thighs as low as the tarsus, whilst in the *MUSTELA vulgaris* the white scarcely reaches the thighs.

Color. The whole of the upper surface, to within three-fourths of an inch of the tail, is of a uniformly dark fawn color. On the upper surface of the tail, the hair is darker brown than the back, and its extremity is for an inch nearly as black as that of the Ermine. In writing this description, we have several specimens of the European *MUSTELA vulgaris* before us; and the ends of the tails in that species are uniformly brown, with here and there a black hair interspersed. Although the hair of the present species, at the extremity of the tail, is black, like that of the Ermine, yet these hairs are short and soft, and more like fur, and do not present the long and coarse appearance of that of the former species. The whole of the under surface is pure white; this color does not commence on the upper lip, as in the Ermine, but on the chin, extending around the edges of the mouth, and by a well defined line along the neck, inner parts of the fore legs, the sides and the thighs, and tapering off to a point at the tarsus. The white on the lower surface is not mixed with brown hairs, as in the *MUSTELA vulgaris*, but extends lower down on the legs. Of the color of this species, in winter, we cannot speak with positive certainty, but feel pretty confident that it is the same as in summer, and that it does not (at least in the latitude of New York) become white in winter. We many years ago, kept several young

Ermiones in confinement, as well as one of this species. The Ermiones all became white in winter, although some of them were not fully grown; the present species underwent no change in color, but remained brown during the whole winter. On another occasion, a specimen of a brown Weasel was brought to us in the month of December, which had been caught in a trap. At that season, the Ermiones are uniformly white. A Weasel exists in the Southern States, and is found as far south as the upper parts of South Carolina and Georgia. It has always been represented to us as never becoming white in winter; and although we possess no specimens at present, we are inclined to regard it as this species.

Dimensions of specimens before us, of the three species referred to above:—

	<i>MUSTELA erminia.</i>		<i>M. vulgaris.</i>		<i>M. fusca.</i>	
	inch.	lines.	inch.	lines.	inch.	lines.
Length of head and body, 11	7	7	0	9	0	
“ Tail vertebræ, 4	6	1	9	2	9	
“ including fur, 6	2	2	1	3	2	
Height of ear, posteriorly, 0	2½	0	2	0	3	

The specimen of the American Brown Weasel described above, was obtained at Long Island, New York, in the month of May.

We subjoin a description of another species of *MUSTELA*, which, although recently made known to naturalists by Dr. Lichtenstein, of Berlin, who received his specimens from the vicinity of the city of Mexico, has not hitherto been known to exist as far north as the locality from which we obtained it.

We agree with Swainson, Lichtenstein, Dr. Richardson, and the most eminent European naturalists, that America divides itself into three natural Zoological boundaries: the first including our whole country from the farthest north, to the tropic of Cancer, where the tropical forms commence, to be called North America; the second, including the Tropics, called Central or Tropical America; the third, South America, including all that region lying south of $23\frac{1}{2}$ south latitude. The southern points of Florida and California will, in this case, be the southern boundary of our North American Fauna. Our specimen was received from North California about latitude 40° .

MUSTELA frenata. (Licht.) Bridle Weasel.

MUSTELA frenata. Licht. Darstellung neuer oder wenig bekannter saugthiere von Dr. Lichtenstein, Berlin, 1827—1834.

M. (frenata.) Vellere supra fulvo; subtus albo-flavo; capite maculâ consperso; fronte fasciâ circumdatâ; gutture albo.

Bridled Weasel. Size of *MUSTELA erminia*; color, fawn above, yellowish white beneath; ears and nose dark brown; a spot on the head, a band above the eyes, and the throat white.

Form. In shape, this species bears a strong resemblance to that of the *ERMINE*. It appears to be somewhat shorter. The toes and nails are more thinly clothed with fur; the ears are narrower and longer.

Color. The nose, sides of the face to above the eyes, and the ears are dark brown; end of the tail

black ; a small spot on the head, between the ears ; the forehead, a broad line extending beneath the ears ; the chin and the throat white. The whole upper surface is a light fawn color ; beneath, yellowish white.

Dimensions.

	Inches.	lines.
Length of the head and body,	11	6
“ tail,	5	6
“ to the end of hair,	6	4
Height of ear, posteriorly,	0	4

GENUS SCALOPS.

SCALOPS *argentatus*. Silvery Shrew Mole.

S. *Pilis tota longitudine albo plumboque annulatis, fronte mentique albido flavescente.*

Silvery Shrew Mole.—Hairs from the roots regularly annulated with white and plumbeous. Forehead and chin, yellowish white ; color of the body shining silver-grey.

Of the several species of Shrew Mole that inhabit North America, this, in point of color, is the most brilliant of any that has been brought to the notice of naturalists. It was discovered in Michigan by Dr. George C. Leib, who has kindly placed it at our disposal.

In form, this species is cylindrical, like that of the common Shrew Mole, (*S. aquaticus*, Lin.,) to which it bears a strong resemblance. It, however presents the following peculiarities, which, we conceive, fully entitle it to be ranked as a new species. It is nearly double the size of the common Shrew

Mole ; the fur is much longer and softer, and differs strikingly in color and lustre. The muzzle is naked and the nostrils are inserted, not on the sides as is the case in *SCALOPS Breweri*, (See Boston Journal of Nat. Hist.,) but in the upper surface near the point of the nose, as in *S. aquaticus*. The eyes are not visible, and appear covered by an integument ; the lips are fringed with rather coarse hairs. This species is pendactylous with naked palms and tail. The teeth are larger, shorter and broader than those of the common Shrew Mole. The fur is long and lustrous on the back, but much shorter and more compact on the under surface.

Color. The teeth and nails are white ; palms, hind feet and tail flesh colored. The nose, forehead, lips and chin are yellowish-white. The fur on the back is from the roots marked with alternate narrow bars of dark blue and white, to near the extremities, where it is broadly barred with ashy white, and so slightly tipped with brown that the lighter color beneath is still visible on the surface, giving it a beautiful silvery appearance, which presents a variety of changes on being exposed to various shades of light. On the lower surface, the hair is plumbeous from the roots to near the extremities, where it is barred with whitish and tipped with light brown. There is a spot of white on the centre of the abdomen, which is apparently accidental, as we have occasionally observed it in other species of this genus, as well as in the true Mole (*TALPA*) of Europe.

Dimensions.

	Inches.	lines.
Length of head and body,	7	1
“ tail,	1	0
Breadth of palm,	0	10
Length of tarsus,	0	7
Incisors, $\frac{2}{4}$	False Molars, $\frac{6-6}{3-3}$	True Molars, $\frac{3-3}{3-3} = 36$

Remarks.

The above was evidently a young animal. Some of the small, thread-like teeth that are placed behind the incisors in the upper jaw, were wanting on one side, and were only barely visible on the other. The young of *SCALOPS aquaticus* have but thirty teeth until they are more than a year old, when they have permanently thirty-six. The skulls of *SCALOPS Townsendii* and *S. Breweri*, have forty-four teeth.

The species of this genus at present known, are,

1. *SCALOPS aquaticus*, Lin:

2. *S. argentatus*.

3. *S. Townsendii*, (Bach.) See Journ. Acad. Nat. Science, vol viii. part 1st, page 58.

4. *SCALOPS Breweri*, (Bach.) Boston Journ. Nat. History, 1841-2. Glossy cinereous, black above, brownish beneath; palms narrow, tail flat, broad and hairy.

Incisors, $\frac{2}{4}$	False molars, $\frac{12}{12}$	True molars, $\frac{8}{6} = 44$
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The nostrils, instead of being inserted in the upper surface of the muzzle as in *S. aquaticus*, are placed on each side, near the extremity of the nose.

	Inches.	lines.
Length of head and body,	5	11
“ tail, (vertebræ,)	1	0
“ “ including fur,	1	5
Breadth of tail,	0	4
“ palm,	0	4

This species was first obtained at Martha's Vineyard, by Dr. Brewer, of Boston, but has since been found in Ohio and several of the northern states.

5. *SCALOPS latimanus*, (Bach., Bost. Journ. Nat. Hist.) Broad-palmed Shrew Mole. Larger than *S. aquaticus*, and nearly the size of *S. Townsendii*. The hair is longer, looser, and less compact than that of *S. aquaticus*, and does not present the same smooth, lustrous appearance. Hair from the roots dark-grey, tipped with dark-brown. Teeth and palms nearly double the size of *S. aquaticus*. Tail naked.

	Inches.	lines.
Length of head and body,	6	8
“ tail,	1	7
Breadth of palm,	0	10
Found in Mexico and Texas.		

Genus ARVICOLA.

ARVICOLA fulva. Glossy Arvicola.

A. Corpore longo ac tenui; naso acuto; auriculis et pedibus longis; velleri tereti ac nitente; supra fusca; subtus cano-fusco.

Glossy Arvicola. Body long and slender, nose

sharp, ears and legs long, fur smooth and lustrous ; dark brown above, hoary brown beneath.

Form. This species presents more distinctive markings than any others of our American ARVICOLÆ; its body is less cylindrical, and its nose less obtuse than any of our other species ; its ears are prominent, rising two lines above its smooth, compact fur ; its lower incisors are very long, and much exposed and considerably curved ; tail longer than the head, thinly covered with short hairs ; legs long and slender, giving the whole animal that appearance of lightness and agility observable in the Mouse.

Color. Incisors, yellowish-white. The hairs, which are very short, like those on the Pine Mouse of Le Conte, are, at the roots on the upper surface, plumbeous, broadly tipped with brown, giving it a bright chesnut color ; the hairs on the legs and toes are a little lighter ; on the under surface, the color is cinereous.

Dimensions.

	Inches.	lines.
Length of the head and body,	3	9
“ tail,	1	4
Height of ear, posteriorly	0	2½
Length of tarsus,	0	7

The specimen was obtained in one of the Western States ; we believe Illinois.

ARVICOLA *nasuta*. Sharp-nosed Arvicola.

A. Arvicola Pennsylvanica longior ; caudâ capite brevior ; pedibus tenuibus ; calce brevissima ; corpore supra ferrugineo-fusco ; subtus ex cinereo et flavo variegato.

Sharp-nosed Arvicola. Larger than *ARVICOLA Pennsylvanica*; tail shorter than the head; legs small, slender; heel very short; the body, above, dark rusty brown; a soiled yellowish grey beneath.

The head of this species is rather longer, and the nose sharper than the *Arvicolæ* in general. The lower incisors are long, and very much curved. The body is less cylindrical than Wilson's Meadow-mouse; the ears are circular, sparingly hairy within, and well covered with fur exteriorly; whiskers shorter than the head; tail thinly covered with hair.

Extremities. Legs covered with short hairs. The fore feet have naked palms; claws small. The tarsus is more than a third shorter than that of the much-smaller *ARVICOLA Pennsylvanica*; the fur on the back is also shorter.

Color. Incisors yellowish-white; the fur, from the roots to near the tips, is greyish-black; the tips are yellowish-brown and black, giving it a rusty-brown appearance. The legs and tail are light-brown; the chin, a soiled white; the fur on the under surface of the body, is dark-cinereous to the tips, where it is light colored.

Dimensions.

	Inches.	lines.
Length of head and body,	5	9
" head,	1	10
" tail,	1	2
From heel to point of nail,	0	6

For the sake of convenient comparison, we give

the dimensions of the largest of six specimens before us, of

ARVICOLA Pennsylvanica.

	Inches.	lines.
Length of head and body,	4	2
“ head,	1	4
“ tail,	1	6
From heel to point of longest nail,	0	11

We are not certain, that this species may not have been indicated, although not described, by Rafinesque, in the American Monthly Magazine, under the name of *LEMMUS Noveboracensis*. His descriptions, however, in every department of natural history, are so short, vague and imperfect, that it is impossible to identify his species with any degree of certainty. They have created such confusion in the nomenclature, that nearly all European and American naturalists have ceased to quote him as authority. Dr. Richardson has, moreover, described an *ARVICOLA* from the Rocky Mountains, which he has referred to the *Noveboracensis* of Rafinesque, but which differs widely from the above species.

Habitat. The specimen which we have described was obtained by Dr. Brewer, near Boston. We received another from Mr. John W. Audubon, who procured it at the Falls of Niagara. We have also frequently found it in the northern parts of New York, where the *ARVICOLA Pennsylvanica* also exists. It appears, however, not to be found as far to the south as the latter species, as we have sought for it in vain in Pennsylvania.

ARVICOLA scalopsoides. Mole *Arvicola*.

A. Capite crasso ; naso obtuso ; vellere curto, molli, bombycino instar velleri *Talpæ* ; supra albo-fusco ; subtus plumbeo.

Head large, nose blunt, fur short, soft, silky and lustrous, like that of the Mole. Color, above, light brown ; beneath, plumbeous.

This species of which we have obtained many specimens from Long Island, and which is not rare in the vicinity of New York, is very distinct from Wilson's Meadow Mouse. His diminutive figure in the 6th volume of his *Ornithology*, is not very unlike this animal ; but his descriptions, both of form and habits, which apply very correctly to *ARVICOLA Pennsylvanica*, have no reference to the present species.

The head is thicker and much shorter than that of Wilson's Meadow Mouse ; the body is cylindrical ; ears scarcely rising above the integument, and completely concealed by the fur. The legs and tail are short ; the latter not as long as the head, and both are covered with very fine and short hairs. The fur on the back, which is soft and fine, and not half the length of Wilson's Meadow Mouse, has none of the coarse hairs which are found in that species. On the under surface, the fur is very short, not more than a line in length.

Color. The teeth are yellowish-white ; the fur on the back is, from the roots, dark plumbeous, tipped with light ashy-brown. This color continues uniform till it reaches the sides, where there is a distinct line of demarcation, commencing at the

chin and running along the neck and sides of the thighs. The whole of this under-surface is of a light cinereous color, the hair being plumbeous at base, and so lightly tipped with white as to appear in some parts spotted with dark blue and ashy-white.

This species bears a strong resemblance to the Pine Mouse of Le Conte (*PSAMOMYS pinetorum*), which is also an Arvicola, than to any other. It is, however, larger, differs considerably in color, and is destitute of the chesnut-brown on the cheeks, which are the characteristic marks of that species.

	Inches.	lines.
Length of the head and body,	4	0
“ tail,	0	10
“ head,	1	0
From heel to point of nails,	0	7

Genus Mus.

Mus humulis. (Bachman.) Little harvest Mouse.*

Mus humulis. Corpore supra rutilo-cinereo et quoad baccas et lineam in utrisque lateribus ferrugineo; subtus flavo-albente.

Little Harvest Mouse. Reddish gray above; cheeks, and line along the side, light ferruginous.

Incisors,	$\frac{2}{2}$	Canines,	$\frac{00}{00}$	Molars,	$\frac{3-3}{3-3}$	} 16 Teeth.

Form. Size about a third smaller than the house mouse. Head rather broad; eyes moderate, placed

* Read before the Academy of Natural Sciences, 1837. Vide Journ. Acad. vol. vii.

much forward ; nose much pointed ; ears broad, extending a little beyond the hair, slightly furred without and along the edges on the inner surface ; legs short ; whiskers reaching to the ears ; tail a little shorter than the body, flattened on the sides, rounded above and beneath, covered with a thin coat of very short hairs. Legs clothed with soft hairs lying close and smooth. The fore feet have naked palms, and four toes with a callous skin, protected by a very minute nail in place of a thumb. The outer toe considerably shorter than the inner, the two middle ones are nearly equal, the claws are slightly hooked ; soles of the hind feet naked.

Color. Teeth yellow. Fur on the back plumbeous at the roots and tinged with black and reddish gray at the tips ; cheeks, and a line along the sides, light ferruginous. Under parts very light buff. Tail brownish drab above, a little lighter beneath ; nails white ; eyes black.

This little quadruped, the smallest of the genus at present known in our country, has been obtained in several localities in South Carolina, and appears to be sparingly diffused throughout the whole state, except in the mountainous districts. It is occasionally found in the vicinity of Charleston, generally in grassy and shrubby fields, especially in the waste lands covered with the brome grass (*ANDROPOGON dissitiflorus*,) of this country, as also in the fields of crab grass, (*DIGITARIA sanguinalis*.) We have occasionally found its nest among the long grass on the surface of the earth, formed of the withered blades of various species of grasses, sometimes containing

a small store of the seeds of the several species of *Paspalum*, *Digitaria* and *Panicum*, especially of the *Panicum Italicum*. The specimen from which this description was taken, was a little the largest of a great number that we have at different times examined. It was a female, procured on the 10th of December, containing four young in its matrix. We presume, therefore, that they produce their young throughout a great portion of the year, and are very prolific. One which we kept in confinement for several months, refused animal food of every kind, and fed only on grains.

Dimensions.

	Inches.	lines.
Length of head and body,	2	9
“ tail,	2	4
Height of ear,	0	3

Mus (Calomys) aureolus. Orange Colored Mouse.

M. auriculis longis; cauda corpore curtior; corpore supra aureo; subtus flavo-albente.

Mouse with long ears; tail shorter than the body; bright orange colored above, light buff beneath.

Form. This species bears a general resemblance in form to the white-footed mouse. (*Mus leucopus*.) It is, however, a little larger, and its ears rather shorter. Head long, nose sharp, whiskers extending beyond the ears. Fur very soft and lustrous. The legs, feet and heel clothed with short, closely adpressed hairs, which extend beyond the nails. Ears thinly covered with hair, which does not en-

tirely conceal the color of the skin. Mammæ four, situated far back.

Color. The head, ears, and whole upper surface is of a bright orange color; the fur being for three-fourths of its length from the roots, dark plumbeous. Whiskers nearly black, with a few white hairs interspersed; tail above and beneath dark brown. On the under parts, the throat, breast and inner surface of the forelegs are white; the belly light buff. There are no very distinct lines of separation between these colors.

Dimensions.

	Inches.	lines.
Length of head and body,	4	3
“ tail,	3	1
“ head,	1	3
“ ear posteriorly,	0	3
“ tarsus including nail, 0		9

In symmetry of form and brightness of color, this is the prettiest species of *Mus* inhabiting our country. It is at the same time a great climber. We have only observed it in a state of nature in three instances, in the oak forests of South Carolina. It ran up the tall trees with great agility, and on one occasion concealed itself in a hole, (which apparently contained its nest,) at least thirty feet from the ground. The specimen we have described was shot from the extreme branches of an oak, in the dusk of the evening, where it was busily engaged among the acorns. It is a rare species in Carolina, but appears to be more common in Georgia, as we

received from Maj. Le Conte, three specimens obtained in the latter state.

NOTE.—We have arranged this species under the sub-genus of Mr. Waterhouse, proposed in the Zoological Society of London, Feb. 17, 1837. (See their Transactions.) It is thus characterized, "SUBGENUS *Calomys* (from *καλός*, beautiful, and *Mus*.) Fur moderate, soft. Tarsus almost entirely clothed beneath the hair. Front molar with three indentations of enamel on the inner side, and two on the outer; and the last molar with one on each side. The type, *Mus* (*CALOMYS*) *bimaculatus*. Two other species have been described from South America, *Mus* (*CALOMYS*) *elegans* and *gracilipes*.

Mus Michiganensis. Michigan Mouse.

M. Buccis flavis, corpore supra fusco-canescente, subtus albido.

Mouse with yellow cheeks, a light grayish brown color above, whitish beneath.

This species bears some resemblance in size and color, both to the common house Mouse, (*M. musculus*), and the white footed Mouse, (*M. leucopus*.) The color on the back resembles the former, and on the under surface the latter. Its tail is considerably shorter than either, and its ears less naked and much smaller than those of *M. leucopus*, neither has it the white feet so characteristic of that species.

Description. The head is of moderate size at base, gradually tapering to a sharp-pointed nose.

The eyes, which appear to be rather smaller than those of the white-footed Mouse, are placed farther forward. Whiskers the length of the head. The ears on both surfaces are so sparingly clothed with short hairs, as, without close examination, to appear naked. Legs short and slender, covered with hair to the extremities of the toes. Soles naked. On each fore foot there are four toes, with a rudimental thumb, protected by a short but rather sharp nail. The hind feet are pēndactylous. The tail, which is round, is clothed with rather short hairs. Mammæ, six pectoral, and four abdominal. The fur on the whole body is very short and smooth.

Color. The incisors, which are small, are yellow. The whiskers are nearly all white; a few immediately before and above the eyes being black. On the cheeks there is a line of yellowish fawn color running along the sides to the neck. The feet, nails, ears and tail are light brown. The hairs on the upper surface are light plumbeous at the roots, and tipped with light brown and black. On the throat, inner surface of the thighs, and on the abdomen, it is yellowish white. There is no distinct line of demarcation between the colors of the back and under surface, nor does the white extend along the sides, as in the white-footed Mouse.

Dimensions.

	Inches.	lines.
Length of head and body	4	0
“ tail	2	6
“ tarsus	0	5
Height of ear	0	4

Three specimens of the above described quadrupeds were obtained in Erie county, Michigan, by Dr. George C. Leib, who permitted us to figure and describe the species.

Mus Carolinensis. Carolina Mouse.

M. Dilute plumbeus, auribus longis et pelosis, cauda corpore longiore.

Tail longer than the body ; ears long and hairy. Color light plumbeous.

In size this species is smaller than the house Mouse. The upper fore teeth are slightly grooved. The head is short, the forehead arched, and the nose rather blunt. Eyes small, but prominent ; whiskers longer than the head. The ears are rather long, and have a very conspicuous incurvation of their anterior margins, which are fringed with hairs ; they are thickly clothed on both surfaces with very short hairs. The legs and feet are small and slender, hairy to the nails. The thumb is almost entirely composed of a short convex nail. The tail is long, clothed with short hairs, rounded in the living animal, but square when in a dried state. The fur, which is of moderate length, is thin, soft and silky.

Color. The incisors are light yellow, tipped with black ; eyes black. The point of the nose, lips, chin, fore feet, and nails are white. Whiskers dark brown. There is a narrow fawn colored ring around the eyes. Ears, legs, and tail light ashy brown. The fur on the back and sides is from the

roots of a uniform light plumbeous color ; the under surface is scarcely a shade lighter.

Dimensions.

	Inches.	lines.
Length of head and body	2	4
“ tail	2	9
Height of ear	0	4
Length of tarsus	0	6½

This species exists very sparingly in the maritime districts of South Carolina, and is usually found in low grounds partially inundated. It readily takes to the water, and swims with great facility.

Mus Le Contii. Le Conte's Mouse.

M. Supra rufo-fuscus, subtus albo-flavo; cauda corpore brevior.

Tail shorter than the body. Reddish brown above, light fawn beneath.

This is a very diminutive species, which, from its form and structure, appears to have its residence under ground. It is about half the size of a full grown house Mouse. Its body is covered by a very thick coat of soft fur, and coarser hairs intermixed. The upper fore teeth are deeply grooved. The head is of moderate size; the forehead so much arched as to present nearly a semi-circle. Nose rather sharp, with a caruncle beneath each nostril pointing downwards. Whiskers shorter than the head. Ears round, moderate in size, and

slightly protruding beyond the long fur, nearly naked; a few hairs are sprinkled along the inner margins. The legs are short and rather stout; feet covered with short adpressed hairs; nails long and but slightly hooked; adapted to digging. The rudimentary thumb is armed with a blunt nail. The tail, which is round, is sparsely clothed with hair.

Color. Teeth yellow; eyes black; nails light brown; whiskers white and black. The fur on the back and chest is plumbeous at base, tipped with a mixture of reddish brown, and dusky, giving it a dark reddish brown appearance. The lips, chin, and feet are a soiled white. On the throat, belly and under surface of the tail, the fur is cinereous; at the roots tipped with fawn color. Upper surface of the tail brown.

The specimen from which the above description was taken, was procured in Georgia by Major John Le Conte, who, with great kindness and liberality, presented us with the whole of his valuable collection of quadrupeds, together with his notes and observations in regard to the species. We subsequently received another specimen from Professor Gibbs, of the Charleston College, who procured it at the plantation of Mrs. Elliott, at Ashapoo, South Carolina.

Dimensions.

	Inches.	lines.
Length of head and body	2	6
“ “ tail	2	0
Height of ear	0	1½
Length of tarsus	0	5

Genus ARCTOMYS.

ARCTOMYS *flaviventer*. Yellow-bellied Marmot.

A. Corpore supra flaveo-subalbicante et nigro; capitis apice maximum in partem nigro; corpore subtus flaveo-aureo; baccis flavis, quoad nasi orbiculum, mento et labiis albis; pedibus fuscis; caudâ ex atro-fuscâ: pilis omnibus ex fusco-flavo marginatis.

Yellow-bellied Marmot.—Upper parts, grizzled yellowish white and black; crown of the head chiefly black; under parts, deep yellow; sides of the muzzle, yellow; point of the nose, lips and chin, white; feet, brownish-yellow; tail, deep blackish-brown, all the hairs tipped with brownish yellow.

The fur on the back is greyish-black at the base; on each hair a considerable space is occupied by dirty yellowish-white, which is gradually shaded towards the apex through brown into black; tips of the hairs yellowish-white; hairs of the belly, greyish-black at the base; hairs of feet, many of them blackish at base; cheeks, grizzled black and white; the former color prevailing; a rusty brown patch on the throat, borders the white hairs of the chin; whiskers moderately black; feet entirely naked beneath.

This species is closely allied to the ARCTOMYS *empetra*, which exists in the northern part of our continent; but the feet are yellow instead of black, as in that animal; the belly is yellow instead of deep rusty-red; and the coloring of the hairs on the back consists of yellowish-white and black instead of rusty-brown, black and white. The head

is narrower, the toes are smaller, and claws only half the length of the *ARCTOMYS empetra*.

Dimensions.

	Inches.	lines.
From point of nose to root of tail,	16	0
Tail to end of fur,	6	10
Heel to point of nail,	2	6½
Height of ear, posteriorly,	0	6½
Point of nose to ear,	3	0

We detected this specimen in the collection brought by the late David Douglass, and by permission of the Zoological Society of London were enabled to describe it. It was brought from the mountains between Texas and California, and is marked in their printed catalogue of 1839, *ARCTOMYS flaviventer*. No. 459, Bachman's MSS.

Genus *SCIURUS*.

SCIURUS lanigerus. Woolly Squirrel.

S. Pilis longis et lanosis; caudâ villosa vixque disticha; naso, auriculis et pedibus pene nigris; vellere supra ex cinereo-fusco subalbicante; subtus, ex albo fusco.

Woolly Squirrel.—Hair long and woolly; tail, large and bushy, scarcely distichous; nose, ears and feet, nearly black; upper surface, grizzled dark grey and brown; under parts, pale brown.

Form. In size, this species is a little less than the Fox Squirrel, (*SCIURUS capistratus*.) The ears, in the two specimens which are before us are de-

cumbent at the ends, as if the animal, in a living state, did not carry them erect, as is the case with the squirrels generally; head short, ears large, thickly clothed on both surfaces with short hairs; feet and toes hairy to the extremity of the nails.

Color. The incisors are dark orange on the outer surface. The whole head, both on the upper and lower surface extending to the neck—the ears, a spot behind the auricle, fore legs to the shoulders, and hind feet to above the heel, black, with a few greyish-brown hairs intermixed. The long fur on the back is, for half the length, light plumbeous, then a line of light brown, and tip with white and black. The hairs on the tail, in which the annulations are very obscure, are, for one-third of their length, brownish-black, then light-brown, then brownish-black, and tip with ashy white. On the under surface, the hairs, which are short, are at the base light plumbeous, tip with light brown and black; the throat is light greyish-brown.

The two specimens, which in other respects were very similar, differ a little in the color of the head; one being lighter colored, the head being dark greyish-brown.

Dimensions.

	Inches.	lines.
Length of head and body,	11	11
“ tail, to end of hair,	11	0
Height of ear posteriorly, including fur,	0	8
From heel to end of middle claw,	2	6

The specimens were obtained from the northern

parts of California; and, from their long, woolly hair, have an appearance of coming from a cold, mountainous region.

SCIURUS mustelinus. Weasel Squirrel.

S. Cervice longissima; caudâ corpore longiore; pilis curtis, rigidis, compressis, teretibus; omni corporis parte nigerrima.

Neck very long; tail longer than the body; hair short, rigid, adpressed, glossy; the whole body jet black.

Form. The usual long neck of this species, together with its long and slender body, and smooth, lustrous hair, give it the appearance of some species of weasel, which has suggested to us the specific name. The ears, which are of moderate size, are nearly naked, there being only a few hairs on the borders; feet covered with very short hairs, which only reach to the roots of the nails. The tail, which is long, but not bushy, is moderately distichous.

Color. The hairs, in every part of the body, are from the roots to the extremities, of an intense glossy black.

Dimensions.

	Inches.	lines.
Length of head and body,	10	0
“ tail,	13	0
“ from shoulder to point of nose,	3	10
“ Tarsus,	2	5
Height of ear posteriorly,	0	6

The specimen was received from California, and

has the appearance, from its thin covering of hair, nearly destitute of the soft fur usually found in the squirrel, of being a native of a warm climate.

Remarks.

This species differs widely from all the other varieties and species of Black Squirrel in our country; it has shorter and coarser hair than *S. capistratus*, and is destitute of the white nose and ears of *S. niger*, with none of the white tufts invariably found in the latter species; and has also a smaller body, although a much longer tail, than *S. Auduboni*, with none of the white, yellow and brown annulations in the hair, which characterise that species.

SCIURUS ferruginiventris. Rust-bellied Squirrel.

S. Vellere supra ex albo-cinereo vario, subtus rufo; armis fuscis.

Rust-bellied Squirrel. Light-grey above, reddish-brown on the shoulders; beneath, bright rufous.

Form. This species, which is a little smaller than the Carolina Grey Squirrel, possesses great symmetry of form, and in shape resembles the latter species. The ears on both surfaces are thinly clothed with hair; tail longer than the body.

Color. Teeth yellow; nails brown; point of nose and whiskers, black; ears, on the outer edges, tinged with brown; within, grey; behind the ears, on the neck, a line of soiled white. On the upper surface, the head, neck, back and tail are light grey, formed by hairs which are light plumbeous, from the roots to near the tips, where they have white

and black annulations; from the outer surface of the fore legs, there is a reddish brown wash, which extends over the shoulders, and nearly meets on the back, gradually fading into the colors of the back and neck. The hairs of the tail are black at the roots, then yellowish, then a broad line of black tipped with white. The feet, on the upper surface are grizzled with white and black. The sides of the face and chin are light gray. The whole of the remainder of the under surface of the body, including a line around the eyes, the throat and inner surface of the legs, is of an uniform bright rufous color.

Dimensions.

	Inches.	lines.
Length of the head and body,	8	10
“ tail,	10	0
Height of ear, posteriorly,	0	5
Length of tarsus,	2	5

Habitat. California.

SCIURUS leporinus. Hare-like Squirrel.

S. Caudâ crassâ maximeque distichâ; vellere supra ex cinereo-fusco; subtus albo.

Tail broad, and very distichous; dark grayish-brown above, white beneath.

Form. Intermediate in size between *S. cinereus* and *S. leucotis*; ears moderate, thinly covered with very short hairs on both surfaces; tail longer than the body.

Color. Teeth orange; whiskers black; nose,

dark brown ; ears, light brown. Above the ears, a tuft of soft, cottony-like fur. The hairs on the back, which are short, are cinereous at the roots, then light brown, tipped with brown and black, giving it so much the color of the English Hare, that we concluded to borrow from it our specific name. On the sides, the color is a shade lighter than on the back. The tail, which from the broad white tips of the hair has a white appearance, is brown at the roots, and three times annulated with black. The upper lips, chin, neck and whole under-surface, including the inner surface of the legs, white ; the hair being of this color from the roots ; feet, a soiled yellowish white. On the outer surface of the hind leg, above the heel, a small portion of the fur is brown. There is also a spot of the same color on the upper surface of the hind foot.

Dimensions.

	Inches.	lines.
Length of the head and body,	11	11
“ “ “ “ tail,	12	6
Height of ear,	0	9
Heel, to end of middle claw,	2	9
Breadth of tail, with hairs extended,	5	6

This species, in its general appearance, so much resembles some varieties of the *S. cinereus* and *S. leucotis*, that, had it not been for its distant western locality, we should at first have been tempted to set it down, without further examination, as one or other of those species. There can, however, be no

doubt, from its differing in so many details of color, of its being distinct from either.

Habitat. Northern parts of California.

SCIURUS mollipilosus. Soft-haired Squirrel.

S. Caudâ corpore curtior ; dorso fusco ; lateribus et colli partibus rufis ; abdomine cinereo.

Soft-haired Squirrel. Tail shorter than the body ; back, dark brown ; sides of the neck and flanks rufous ; under surface, cinereous.

Form. This species is a little larger than *SCIURUS Hudsonicus*, with which we have compared it ; its legs especially are considerably longer and more robust ; the fur is much softer, the hair longer and less glossy than that of the former species.

Color. The teeth are yellow ; the upper parts, including the nose, ears and outer surface of the legs and upper surface of the tail, are dark brown. This color is formed by the hairs being plumbeous at the roots, tipped with light brown and black. On the sides of the neck, the shoulder and near the thighs, the color is reddish brown. The tail, which is not very distichous, is brown, twice annulated with black ; a few of the hairs are tipped with grey. On the under surface, the lips, cheeks and chin are greyish-brown ; the inner surface of the fore legs, the throat and abdomen cinereous, lightly tinged in some places with rufous.

This species differs so widely in all its details, from *S. Hudsonicus*, that it is scarcely necessary to point out their distinctive marks of difference. The space occupied by the lighter colors on the under

surface is much narrower than in the former species, nor is there, as in that species, any black line of separation between the colors of the back and under surface.

	Inches.	lines.
Length of body,	8	6
“ tail to end of hair,	7	0
Height of ear,	0	5
Tarsus,	2	1

Habitat. Northern parts of California.

SCIURUS occidentalis. Western Squirrel.

S. Vellere longo ac molli; auriculis aretis; caudâ corpore longiore; capite, fasciâ dorsali et caudâ nigris; lateribus furvis; abdomine fusco.

Western Squirrel. Fur long and soft; ears narrow; tail longer than the body; head, dorsal line and tail, black; beneath, dark rusty brown.

In size, this species is a little larger than the Northern Grey Squirrel, (*S. leucotis*), and may be compared with the black variety of that species. The ears, which are elliptical in shape and narrower than in most of our species, are thickly clothed with soft, fine hair on both surfaces. The tail is very long, and, instead of being distichous, as in most of the species, is in the prepared specimen perfectly round. The feet are clothed with hair, partially concealing the nails. The hair is longer, more diffuse, but not softer than that of *S. leucotis*.

Color. The head, ears, upper surface of the legs, tail and a broad dorsal line, black. On the sides,

the hair is plumbeous at the roots, then a line of brown slightly tipped with black. On the under surface, this species is dark brownish-black, from the lips to nearly the extent of the jaws. On the throat, inner surface of the legs, and whole under parts of the body, there is a mixture of black and brown fur, giving it a dark, rusty-brown color. There are no annulations in the hairs of the tail.

Dimensions.

	Inches.	lines.
Length of head and body,	11	0
“ tail to the end of hair,	14	0
Height of ear,	0	8
Heel to end of nail,	2	9

When old father Linnæus comprehended the whole of his description of an American Squirrel in the single word *niger*, he was not aware of the number of species of Black squirrels which were yet to be detected in our western world, and the difficulty his successors would find in identifying the species to which he referred; for there are now no less than eight North American squirrels which are either permanently, or in some of their varieties, black.

The present cannot, however, be identified with any of our known species. It approaches nearest to the black variety of the Northern Grey Squirrel, but is sufficiently distinct from that to entitle it to another name. The species inhabiting the Atlantic states have, moreover, never been found west of the Rocky Mountains, nor, indeed, has any but the Fox

squirrel (*S. capistratus*) been observed to the west of the Mississippi River.

Genus SPERMOPHILUS.

SPERMOPHILUS *annulatus*. Annulated Marmot-Squirrel.

S. Super cervinus, pilis nigris interspersis, subtus albido. Caudâ corpore longiore, annulis 17—20 nigris.

Annulated Marmot-Squirrel. Reddish brown above, speckled with black, white beneath. Tail, which is longer than the body, annulated with from 17 to 20 black bands.

Description. In size, this species is scarcely larger than the Hudson's Bay Squirrel, (*S. Hudsonicus*.) In the shape of the head it resembles SPERMOPHILUS *Parryi*. The ears, however, are much shorter, being scarcely visible above its short coat of rather coarse adpressed hairs. They are thickly covered with hair on both surfaces. The nose is sharp; whiskers, which are numerous, the length of the head. The eyes, which are of moderate size, are situated on the sides of the head. The os frontis is rounded between the orbits, as in *S. Franklinii*. The cheek pouches are pretty large, and open into the mouth immediately anterior to the grinders. The body is more slender than the SPERMOPHILES in general, and in this and several other peculiarities which will be mentioned, this species approaches the Genus SCIURUS. On the fore-foot a sharp conical nail is inserted on the tubercle, which represents the thumb. There are

four toes, covered to the extremities of the nails with a close smooth coat of hair. The first and the fourth toe are of equal length. The second and third, which are longest, are also uniform in length. The nails are short, crooked, and sharp, like those of the Squirrels, and not like the Marmots and SPERMOPHILI in general, which are long, slender, and but slightly curved. The legs are long and slender. The hair on the back is rather short, and lies close and smooth. The short fur, which lies concealed beneath this coarser hair, is rather sparingly distributed. On the under surface the hairs are longer, and so thinly and loosely scattered as to leave the skin visible in many places, especially on the abdomen and inner surface of the thighs. The hind feet, which are thickly covered with short smooth hairs, have five toes. The soles, as well as palms, are naked. The tail, by its great length and singular markings, presents a distinguishing peculiarity in this species. It is flattened, and the hairs admit of a distichous arrangement, but the tail is narrower and less bushy than those of the Squirrels.

Color. The incisors are deep orange. Nails brown; whiskers black. Nose and sides of the face chesnut brown. There is a line of soiled white above and around the eyes. The hairs on the upper surface are yellowish brown at the roots: barred about the middle with black, then another line of yellowish brown, and tipped with black, giving it a dark greyish-brown, and in some lights, a speckled appearance. These small spots are, how-

ever, no where well defined. The upper surface of the feet and legs is yellowish brown. On the under parts, the chin, throat, the belly and inner surface of the legs and thighs are white. The tail is annulated with about nineteen black, and the same number of cream-colored bands, giving it a very conspicuous appearance. These annulations commence about three inches from the root of the tail, and continue to be well defined till near the extremity, where the colors become more blended, and the annulations are scarcely visible. On the under surface the tail is pale reddish-brown, irregularly and not very distinctly barred with black.

Dimensions.

	Inches.	lines.
Length, from point of nose to root of tail,	8	2
“ tail vertebræ,	8	0
“ “ to end of hair,	9	4
From heel to end of middle hind claw,	1	10
Height of ear posteriorly,	0	1½
Length of longest fore claw,	0	2
Length of longest hind claw,	0	2½

General Remarks.

In every department of natural history a species is occasionally found which forms the connecting link between two genera, rendering it doubtful under which genus it should properly be arranged. Under such circumstances, the naturalist is obliged to ascertain, by careful examination, the various

predominating characteristics, and finally, place it under the genus to which it bears the closest affinity in all its details.

SPERMOPHILUS was proposed by F. Cuvier as a subgenus to ARCTOMYS. Although it has been generally adopted by naturalists, we regard it as sufficiently characteristic to form a genus, under which we may safely arrange a large group of animals whose residence is among the prairies of the west, the deserts of Africa, and the mountainous regions of Europe and Asia, where the various species either dig burrows in the ground, or are sheltered among the rocks, thus rendering the protection of the forest unnecessary to them: The Souslik (CITILLUS) of the north of Germany and Europe, and the CITILLUS *leptodactylis*, and *C. mugo-saricus* of Bucharia, recently described by Prof. Lichtenstein, of Berlin, and a considerable number of American species, will render this a large and interesting genus. The SPERMOPHILI are intermediate in character between the Squirrels and Marmots. They have the lightness of form of the former, and burrow in the ground like the latter. By their cheek pouches, of which the true Squirrels and Marmots are destitute, they are distinguished from both. The second inner toe on the fore-foot of the SPERMOPHILI is the longest, whilst in the Squirrel's the third toe is longest. But in these closely allied genera, there are species in each which approach those of another genus. Thus, our Maryland Marmot (*A. monax*) has a rudimentary cheek pouch in which a pea might be inserted, yet

in every other particular it is a true *ARCTOMYS*. The downy Squirrel, (*SCIURUS lanuginosus*,) (See Jour. Acad. Nat. Sci., vol. 8, part 1st, p. 67,) by its short ears, broad head, and not very distichous tail, approaches the *SPERMOPHILI*; yet by its being destitute of cheek pouches—by its soft downy fur, and its hooked and sharp claws, of which the third, as in the Squirrel's, is longest, it is more allied to *SCIURUS*. On the other hand, the species now under consideration has the long legs, slender form, and sharp hooked claws of the Squirrel. The two middle toes of the fore-foot being of equal length, prove its affinity to both genera. But in the general shape of its body, its cheek pouches, its short ears, and smooth rigid hair, it must be regarded as belonging to the genus *SPERMOPHILUS*. We consider this species and the downy Squirrel as connecting links between *SCIURUS* and *SPERMOPHILUS*; as we regard *SCIURUS Hudsonicus* the connecting link between *TAMIAS* and *SCIURUS*.

The specimen we have described was obtained on the western prairies; the locality was not particularly stated. It was politely presented to us by Mr. Spencer F. Baird, of Carlisle, Pennsylvania.

NOTE.—More extended descriptions and a fuller account of the species embraced in this Memoir, together with accurate lithographic illustrations, will be found in our work on the Quadrupeds of North America, now preparing for publication.

Description of a new species of Chameleon from Western Africa. By EDWARD HALLOWELL, M.D.

Read October 19, 1841.

CHAMELEO *gracilis*. Pl. 18.

Characters. Head of moderate size, presenting upon its upper surface a longitudinal carina, bifurcated anteriorly; body and extremities slender, tail somewhat longer than total length of head and body.

Description. The head is of moderate size, flattened above, depressed in front, presenting upon its upper surface a longitudinal carina, bifurcated anteriorly; each of the divisions resulting from this bifurcation, terminates near the posterior extremity of the supraciliary ridge; in front of the eye is a ridge continuous with one above the orbit, extending towards the extremity of the nose. No denticulations are observed upon the supraciliary ridge, or the one just described in the specimen observed, nor upon the longitudinal carina, or its divisions; but they are very distinct along the superior margin of the temples. A number of small tubercles are seen upon the face, quite near to the extremity of the nose, and also upon the sides of the head in front of the nostril: a marked concavity exists upon the upper and posterior part of the head, immediately behind the bifurcation of the longitudinal carina: the space in front comprised between the two

branches is perfectly plane; the head is covered above with polygonal scales of unequal size, and smooth for the most part; those situated in the depressions upon the upper and posterior part of the head are somewhat larger and more uniform in size than those upon the vertex and face; the scales upon the sides of the head are of nearly uniform size, many of them are tuberculated; there are nineteen teeth on each side of the upper and lower jaw; the scales upon the sides of the body are of various shapes, some of them hexagonal, others pentagonal; the greater number are quadrangular: they vary also in size; those upon the body, near the spine, are the largest; some of the scales present a plane surface; others are more or less convex, and many on examination with a glass are observed to have a very distinctly elevated point in the centre; numerous small granules are interspersed between the scales upon the abdomen; none are observed upon the sides: the scales upon the throat are irregular in size and shape, many of them are tuberculated, those along the median line being the largest; the scales upon the abdomen are granular, and of nearly equal size, many of them presenting an elevated point in the centre; those upon the under surface of the tail are oblong, hexagonal, or pentagonal, many having a depression in the centre; those upon the under surface of the hands and feet are very distinctly quadrangular; they are arranged in transverse rows; the extremities are slender; the tail is somewhat longer (about a fourth of an inch,) than the total length of the head and body.

Color. The predominating color is green, presenting different shades under different circumstances; at times, the snout and margin of the jaws, the neck, limbs and tail are marked with ferruginous; and a narrow vitta of a light chocolate color is seen extending from the axilla to near the groin; the whole of the body presents at times the latter color, mixed with dusky green or ferruginous; a triple row of black spots is observed upon the tail, extending from the root to within a short distance of its extremity; a similar row exists upon the back, corresponding with the transverse processes of the vertebræ: while one side of the animal presents these shades, the other, or that which is less exposed to the light, is of a uniform pea-green color, except the lateral vitta and a small spot above the shoulder, which are of a light flesh color, and at times perfectly white; on exposing the animal suddenly to the light of a candle, on one occasion, four or five irregular bands of a light chocolate color were observed upon the body, extending from the back to the middle of the belly, the intervening spaces as well as the bands themselves being marked with numerous dark colored spots; these bands often became dark green, the intervening spaces being a shade or two lighter; seven or eight converging bands of the same dark green color are observed upon the eyelids, their broadest part being directed towards the margin of the orbit; the pupil is black; the iris golden; the under surface of the belly, the groins, axillæ, as well as the inner surface of extremities, are whitish with a shade of green. The

same banded appearance above described, was frequently observed when the animal was in exercise, as when employed in efforts to get out of its cage, or when allowed to walk upon the table or floor; when quiescent these bands were rarely noticed. On the 9th of July she laid twenty eggs; these were perfectly white, and of an oval figure; for several days she had been restless, and was employed the greater part of the day in scratching in one of the corners at the bottom of the cage; the coloration of the animal at this period was different from that noticed at any other; the whole body presented a deep copperas green color, changing at times to a dusky brown: at times the body had a mottled appearance; at others four or five dark colored transverse bands were noticed, the intervening spaces as well as the bands, presenting numerous light green spots upon a ground of dusky green; on turning the animal suddenly round to the light, the side opposite to that described appeared of a rich sap green color, changing in a few moments to a deep bottle green, the transverse bands becoming less and less distinct; the spot over the shoulder and the lateral vitta were reddish brown: immediately after death the green assumed a yellowish tint, and two large blotches appeared on each side of the body of the color of lamp black.

Sept. 11, 1841. The animal has now been immersed in alcohol for more than a year, and presents a very different appearance from that which existed during life; the head, sides of the body, tail and upper surface of extremities are of a light bluish or

leaden color; the dark colored blotches upon the sides are visible, but much less distinct than at the time of the death of the animal; the throat, abdomen, and under surface of extremities and tail, are whitish; the spot upon the shoulder and lateral vitta are dirty white.

Dimensions. Length of head, one inch (Fr.): greatest breadth six lines; height seven lines; length of neck two lines; of body two inches eight lines; of tail four inches seven lines; of anterior extremities two inches; of posterior, one inch. (These measurements were taken after the specimen had been long immersed in spirits.)

Habits. The animal arrived in this city from New York on the 12th of June, 1840. During the first three days its appetite was good, spending the greater part of the time in catching flies by means of its long extensible tongue, which on one or two occasions it was observed to protrude to the extent of nine inches. The motions of the animal were very sluggish, passing almost the whole of the day upon the perch of the cage in which it was kept, turning the eyes in every direction in search of flies, which were no sooner within reach than the tongue was protruded with the rapidity of lightning, and the insect rapidly drawn into the mouth. During the three or four following days, which were rainy and cold for the season, her appetite appeared to have failed; she was not seen to catch a fly, although many were quite near, but she often descended from the perch to drink; notwithstanding her indisposition to eat, she would watch for hours the

motions of the flies about the cage, the eyes preserving their accustomed brilliancy of expression. On being placed upon a plane surface, she walked with more care and often with more rapidity than might have been expected from the pincer like arrangement of the feet and hands, the fingers and toes being fully extended; but the usual manner of progression and general appearance of the animal when in motion, corresponded with the description of them given by Valisnieri. During the time that she was laying her eggs, she did not eat, nor had she taken food for several days previous; she became greatly emaciated, and died almost immediately after their expulsion from the body.

Habitat. Liberia, in Western Africa.

General observations. The specimen above described was purchased by the Rev. Charles Eden, of Monrovia, of one of the African natives, and sent to Dr. Blanding of this city, who with his accustomed liberality, placed it in my hands for observation and description. A drawing of the animal was recently shown to M. Bibron, of the Garden of Plants, by the artist who made it, who informs me that he considered it as new.

Description of two new species of the Genus Perca, from the Susquehanna river. By S. S. HALDEMAN.

Read January 11, 1842.

PERCA (PERCINA) *nebulosa*. Body slender, slightly compressed; head and mouth small; dorsal fins separated; lateral line straight; scales small, and strongly serrated; tail truncated; pectoral fins very long; branchiostegous rays six. Yellowish brown, with irregular dark transverse bands. The fin rays are D 14+15: P 14: V 7: A 11: C 18.

Length five and a half inches.

P. minima. Colored like the preceding, but the shading is arranged in spots instead of bands; the first dorsal fin is proportionally higher and shorter, having but nine rays. Length two inches. Perhaps the young of the former.

The subgenus *PERCINA is distinguished from PERCA by the want of a serrated margin to the preopercle. The opercle (which ends in a spine) and cheeks are covered with scales. The teeth are all fine, and situated upon the maxillaries and vomer.

Hab. The Susquehanna.

Description of a new species of Cyclops, and two species of Tubifex. By S. S. HALDEMAN.

Read March 1, 1842.

CYCLOPS setosa. Body ovate, light yellowish brown; tail bifurcated, each side bearing three very long plumose setæ, of which the central ones are double the length of the inner, and one-third longer than the outer ones.

Hab. A spring near Marietta, Pennsylvania.

Obs. Rather smaller than *C. quadricornis*, to which it bears a very close resemblance; the caudal filaments are, however, much longer than in that species, as figured by Jurine and Baird.

TUBIFEX gracilis. Body enlarging gradually from the head backwards, and capable of extension to twice its contracted length; annulated, the annulations not commencing immediately at the head; every eighth or tenth is larger than the rest, and projects a little beyond them, bearing a pair of bristles (nearly equalling half the diameter of the body in length) on each side, and arising from the same root. These bristles are thrown forward and backward, and can be retained together, or separated to a considerable distance at their free extremities. The intestine is linear when the body is drawn out, but thrown into many folds when con-

tracted ; it occupies nearly the whole of the abdominal cavity, and is divided by strictures into lengths somewhat greater than its diameter. Color pale ochraceous, or whitish, semi-transparent ; when compressed, a very pale green stripe appears upon each side of the intestine ; setæ transparent.

Length one inch and a quarter ; diameter one quarter of a millimetre.

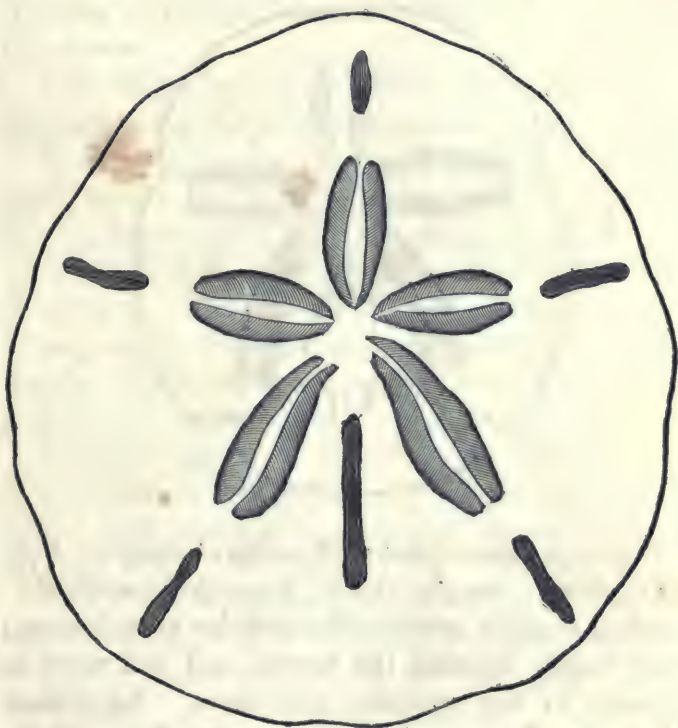
Hab. With the preceding.

TUBIFEX simplex. Greenish brown ; surface smooth, the annulations scarcely apparent. Twice the size of the preceding species, and very abundant in the Monongahela river at Pittsburg.

Description of two new species of Fossil Scutella, from South Carolina. By EDMUND RAVENEL, M. D.

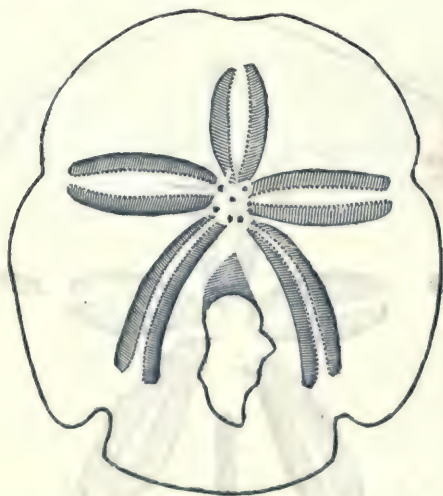
Read September 17, 1841.

GENUS SCUTELLA.



SCUTELLA *Caroliniana*. Specific character: Nearly round; slightly convex above; posterior margin truncated; ambulacra short, elliptical, the two

posterior slightly curved and nearly a third longer than the others; in a line with each there is an oblong perforation extending almost to the margin; between the two posterior ambulacra there is another perforation, longer than the others, and more central, at the extremity of which, beneath, near the mouth, is the vent. Mouth central; diameter about six inches.



SCUTELLA macrophora. Specific character: Sub-ovate, thick; margin thick; truncated posteriorly; notched slightly opposite the anterior ambulacrum; more deeply opposite the lateral, and still more so opposite to the posterior ambulacra. Ambulacra elliptical; the posterior pair long, and gracefully curved, so as to give room between them for a very large-irregular perforation, the margin of which is considerably raised, extending to the centre of the

shell, giving the upper surface a remarkable elevation. The under surface is flat, rather hollow, particularly near the opening; mouth anterior to the centre; anus distant from the mouth one-fourth of the space from the mouth to the posterior margin.

Diameter of large specimens nearly four inches.

These fine fossils are found in a calcareous deposit upon my plantation on Cooper River, in St. Thomas's Parish, about seventeen miles from Charleston.

The limestone is granular, and remarkably adapted to the purpose of calcareous manure.

In digging it out and spreading it on the fields, these fossils are found in considerable numbers; the *S. macrophora* is particularly abundant and perfect. The *S. Caroliniana* is also abundant, but from its size, and the number of openings in it, it is very easily broken, and is only obtained in fragments. I have only one perfect specimen, and that is not quite two and a half inches in diameter.

In examining these fossils in the light, the surface exhibits bright crystalline faces; the material of the shell seems to have become crystallized subsequent to the destruction of the animal matter.

It is perhaps remarkable that many of the crustaceous remains in this deposit are well preserved, while the shells proper are for the most part decomposed. A few specimens of two or three species of PECTEN, of one or two OSTREE, a PLICATULA and a BALANUS, are occasionally met with,

while imperfect casts of numerous species are very common.

NOTE.—The calcareous deposit to which the preceding fossils belong, is classed with his newest cretaceous formation by Dr. Morton, who first described its organic remains in his *Synopsis*, published in 1834. But the recent observations of Mr. Lyell seem to prove that these strata do not belong to the chalk, but to the Eocene period. See page 216 of *this volume*.—Eds.

Description of a new Genus of Serpents from Western Africa. By EDWARD HALLOWELL, M. D.

Read April 12, 1842.

The family of Vipers has been divided by Cuvier into four groups, viz.; 1st. Those which have upon the head imbricated and carinated scales similar to those upon the back, (*V. brachyura*.) 2d. Those which have the head covered with small granulated scales, (*C. berus*, Lin.) *VIPERA Laurenti*. 3d. Those very similar in other respects to the preceding, but which have in the middle of the top of their head thin plates, a little larger than the scales which surround them, (*C. chersea*, Lin.) 4th. Those which have the head covered with plates almost similar to the Colubers, (*C. Hemachates*, Lin.) The animal about to be described approaches nearest the last of these divisions, con-

stituting the genus SEPEDON of Merrem, but differs from it in the arrangement of the subcaudal plates—those at the extremity of the tail being single.

GENUS DISTICHURUS. Pl. 19.

Characters. Head covered with large plates ; plates under the tail single near its extremity ; the rest bifid ; poisonous fangs in the upper jaw.

DISTICHURUS *Maculatus*.

Description. The head is small, slightly flattened above, depressed in front, covered with nine plates ; the rostral plate is rather large, pyramidal, rounded in front, its apex projecting backwards ; the fronto-nasal are irregular in shape, the posterior and external angle being prolonged to meet the loreal plate ; its inferior curved, to form the upper margin of the nostril ; the frontals are irregularly quadrilateral ; the vertical plate is hexagonal, its lateral margin being slightly excavated where it joins the supra-orbital plate ; the occipital are small, pentagonal ; the supra-orbital are oblong, quadrilateral, projecting but slightly over the eye ; the lateral and inferior margin of the orbit is bordered by a row of five or six plates ; of these, the two anterior are the smallest ; the nasal plates are two in number ; the nostrils are large ; there are six superior labial plates ; of these, the second is the smallest ; the fourth the largest ; the fangs are small ; the tongue is long, enclosed in a sheath at its base,

bifid at its extremity; the body is brownish or ash-colored above, (in spirits) with numerous dark colored lines and spots upon the sides; there is a series of dark colored bands upon the middle line of the body, having the form of chevrons bordered with white; a large triangular blotch exists upon the head, extending a short distance along the neck, resembling in shape an arrow head; the throat, abdomen, and under part of tail, are silvery white; the scales upon the back are carinated; the carinae upon the sides are much less distinct than those upon the back, presenting the appearance rather of elevated points in the centre of each scale; many of the scales are perfectly smooth; the tail is short; there are two small fangs in the upper jaw. Abdom. scut. 120; sub-caud. 23—eighteen of which, or those nearest the anus, are bifid; the remaining five, at the extremity of the tail, being entire.

Dimensions.

	Inches.	lines.
Length of head,	0	6 (Fr.)
Greatest breadth,	0	4
Length of body,	10	3
Greatest circumference of body,	1	8
Length of tail,	1	4

Habitat. Liberia, Western Africa.

The specimen from which the above description is taken, was sent from Liberia to the Academy, about two years ago, by Dr. Goheen, one of its corresponding members. But little is known of its habits.

Meteorological Observations made at Philadelphia during the year 1841. By WILLIAM S. ZANTZINGER, M. D.

Read April 12, 1842.

MONTHS.	Thermometer.					Days of rain, hail, snow.	Cloudy, hazy, &c. days.	Clear days.	Inches of rain and melted snow.
	Maximum temperature.	Minimum temperature.	Range.	Mean temp. at 8 A. M.	Mean temp. at 3 P. M.				
January,	53	6	47	30.12	34.24	12	11	8	7.837
February,	56	7	49	27.06	35.26	7	14	10	1.387
March,	73	24	49	37.19	47.21	11	16	8	5.821
April,	70	30	40	46.21	54.30	12	14	7	6.456
May,	89	38	51	56.28	66.27	12	14	12	3.269
June,	94	62	32	73.22	81.22	10	13	14	3.114
July,	95	62	33	76.20	78.12	6	9	21	3.280
August,	92	61	31	73.10	81.24	9	14	12	9.102
September,	87	56	31	66.14	71.22	8	15	12	1.895
October,	64	41	23	45.25	55.08	6	16	13	3.198
November,	68	22	46	39.10	42.15	12	11	10	4.224
December,	55	15	40	32.15	36.26	9	17	6	5.917
Totals.						114	164	113	55.500

Maximum temperature of the year, (July 25th, 1 P. M.) 98°.
 Minimum " " (January 3d,) 6°.
 Mean " " 53.75.

Average of the Seasons.

Spring, 51.31.
 Summer, 77.34.
 Autumn, 53.13.
 Winter, 32.69.

Greatest range of the Thermometer (May) 51.

In the table, the column indicating the number of rainy &c. days, includes all those on which

rain, snow, &c. fell, either during the whole or a part of a day, or merely in showers, as occurs so frequently during the spring and summer months. The column of clear days indicates those which are usually regarded as such, although, in many instances, a few clouds may have appeared during some period in the day. Of these clear days, 84 occurred between the 1st of May and the 1st of November, leaving but 49 for the remaining six winter and spring months.

The following tables are intended to show the degree of prevalence of particular winds in each month, and at the different seasons. In the second table, those winds are grouped together on the first line, which in this latitude are usually accompanied by clear weather, and those on the second which commonly bring with them the reverse.

<i>Prevailing winds of each month.</i>	<i>Jan.</i>	<i>Feb.</i>	<i>March.</i>	<i>April.</i>	<i>May.</i>	<i>June.</i>	<i>July.</i>	<i>Aug.</i>	<i>Sep.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>	<i>Totals.</i>
W., N. W., & N.	15	19	13	15	18	7	16	11	10	15	12	17	168
S. & S. W.	7	10	11	10	14	16	14	15	8	14	12	11	142
E., N. E., & S. E.	9	6	11	14	9	14	3	10	15	4	10	9	114

<i>Prevailing winds of the Seasons.</i>	<i>Spring.</i>	<i>Summer.</i>	<i>Autumn.</i>	<i>Winter.</i>	<i>Totals.</i>
N., N.W., W., & S. W.	75	75	65	78	293
E., N. E., S. E., & S.	40	31	35	25	131

The year 1841 was remarkable for the large amount of rain which fell, ($55\frac{1}{2}$ inches,) greatly exceeding the customary average; and also, for the quantity of snow, which was upwards of 50 inches. Thirty-four of this was due to the spring months alone—10 inches fell as late as the 2d of April.

Ice one-fourth of an inch in thickness was found in the suburbs early on the morning of the 3d of May, the previous day having been stormy, with the wind at S., S. W., and very high—the mercury indicating 62° until late in the afternoon.

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ERRATA.

Page 234, for "Helderberg system," read *Schoharie system*.

Same page, for "Ontario rocks," read *Mohawk rocks*.

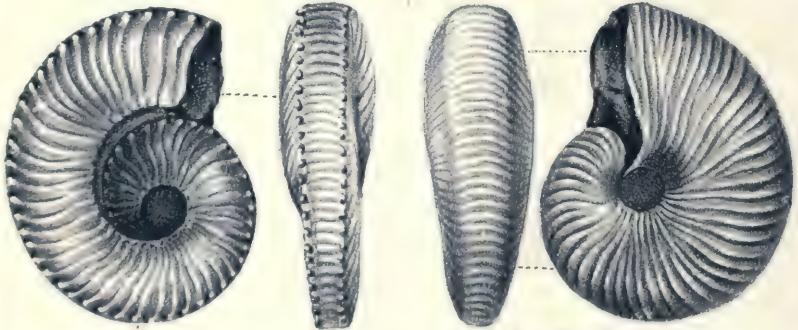
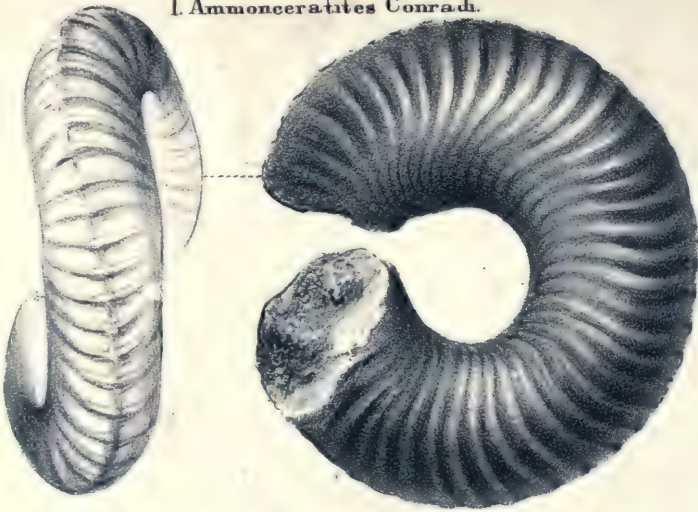
Page 204, fourth line from top, for "varies," read *vary*.

Same page, fifth line from top, for "was," read *were*.



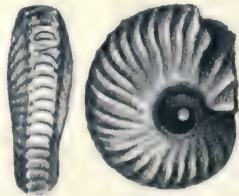


1. *Ammonceratites Conradi*.

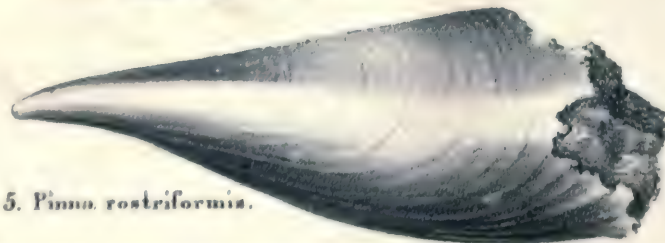


2. *Am. Mandanensis*.

3. *Am. Nicolletii*.

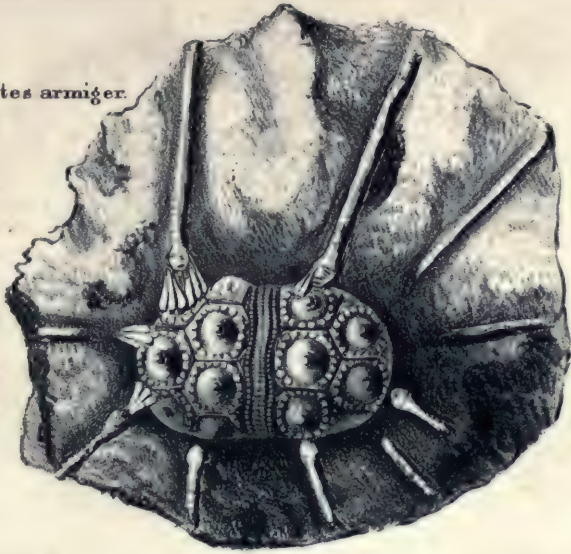


4. *Am. abyssinus*.

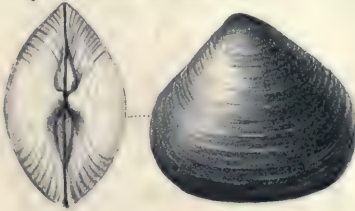


5. *Pinna rostriformis*.

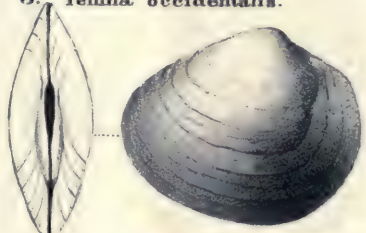
1. *Cidarites armiger*.



2. *Cytherea Missouriana*.



3. *Tellina occidentalis*.

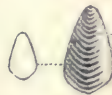


4. *H. annulifer*.

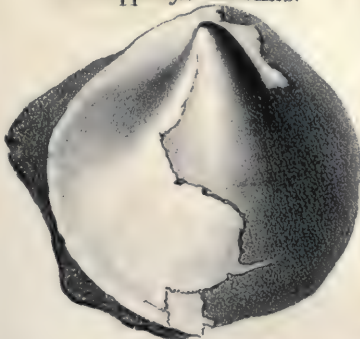


5.

Planularia cuneata.



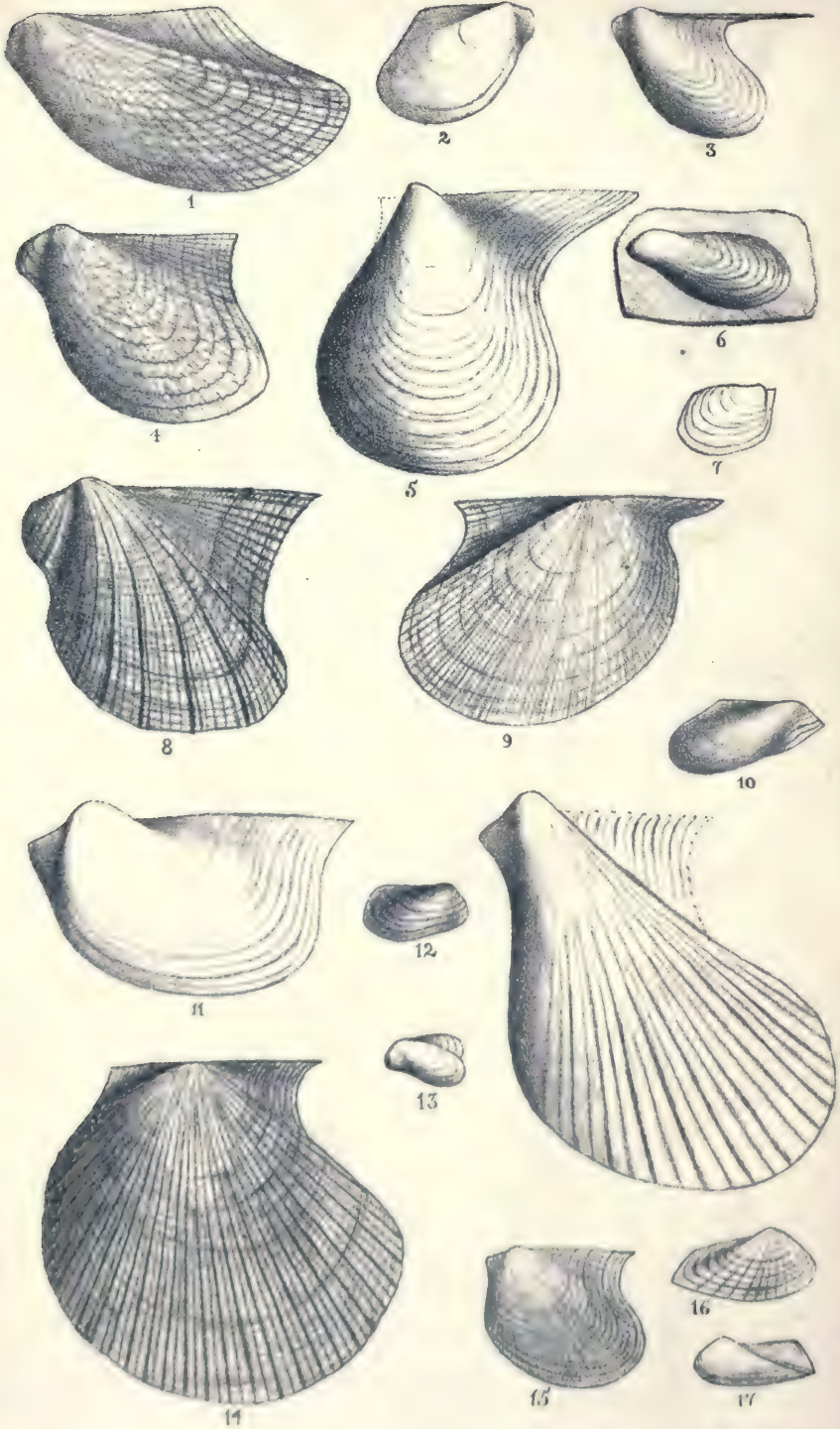
6. *Hippouyx borealis*.

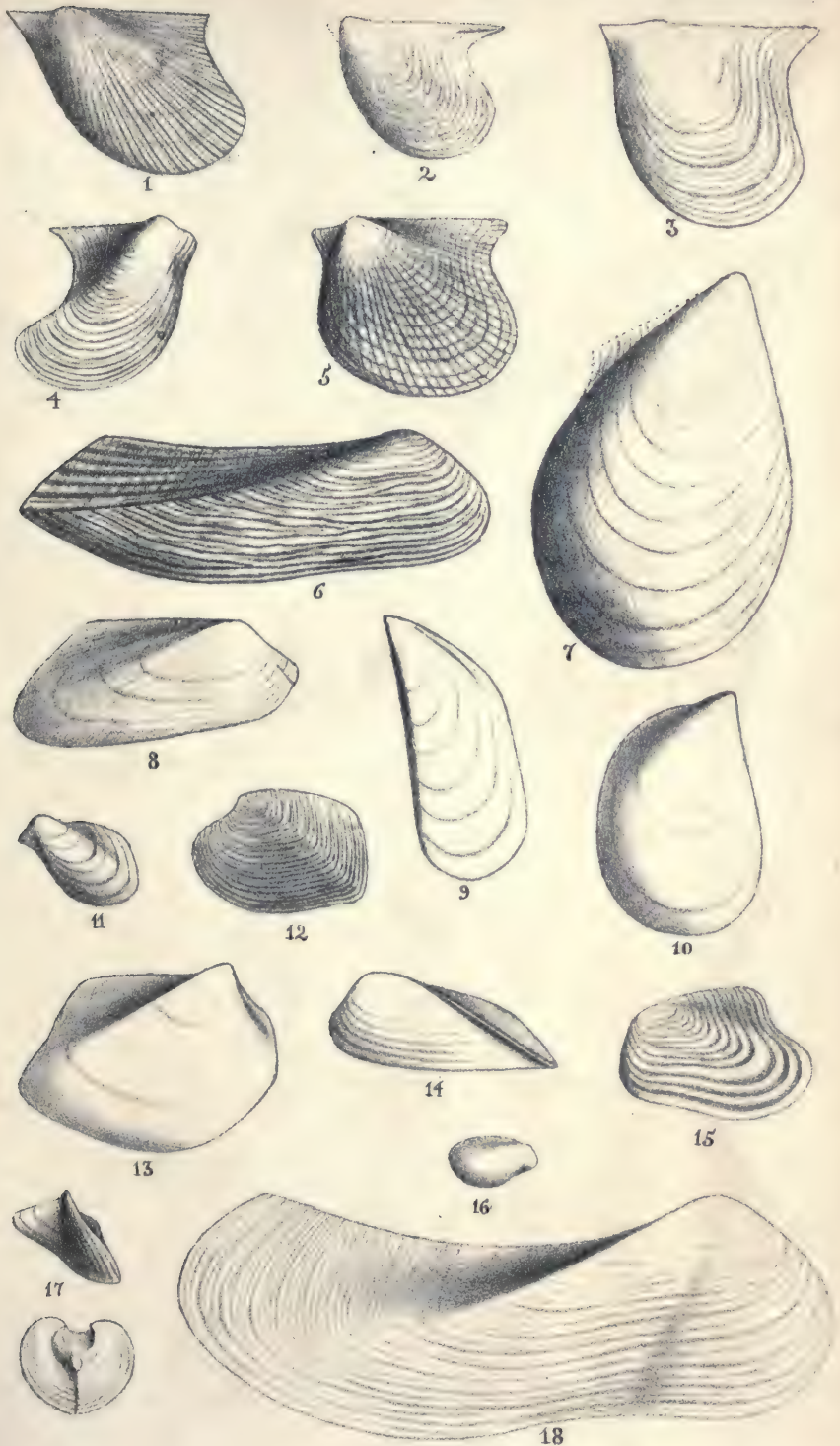


7. *Pyrocodus Mortonii*
(Mantell)

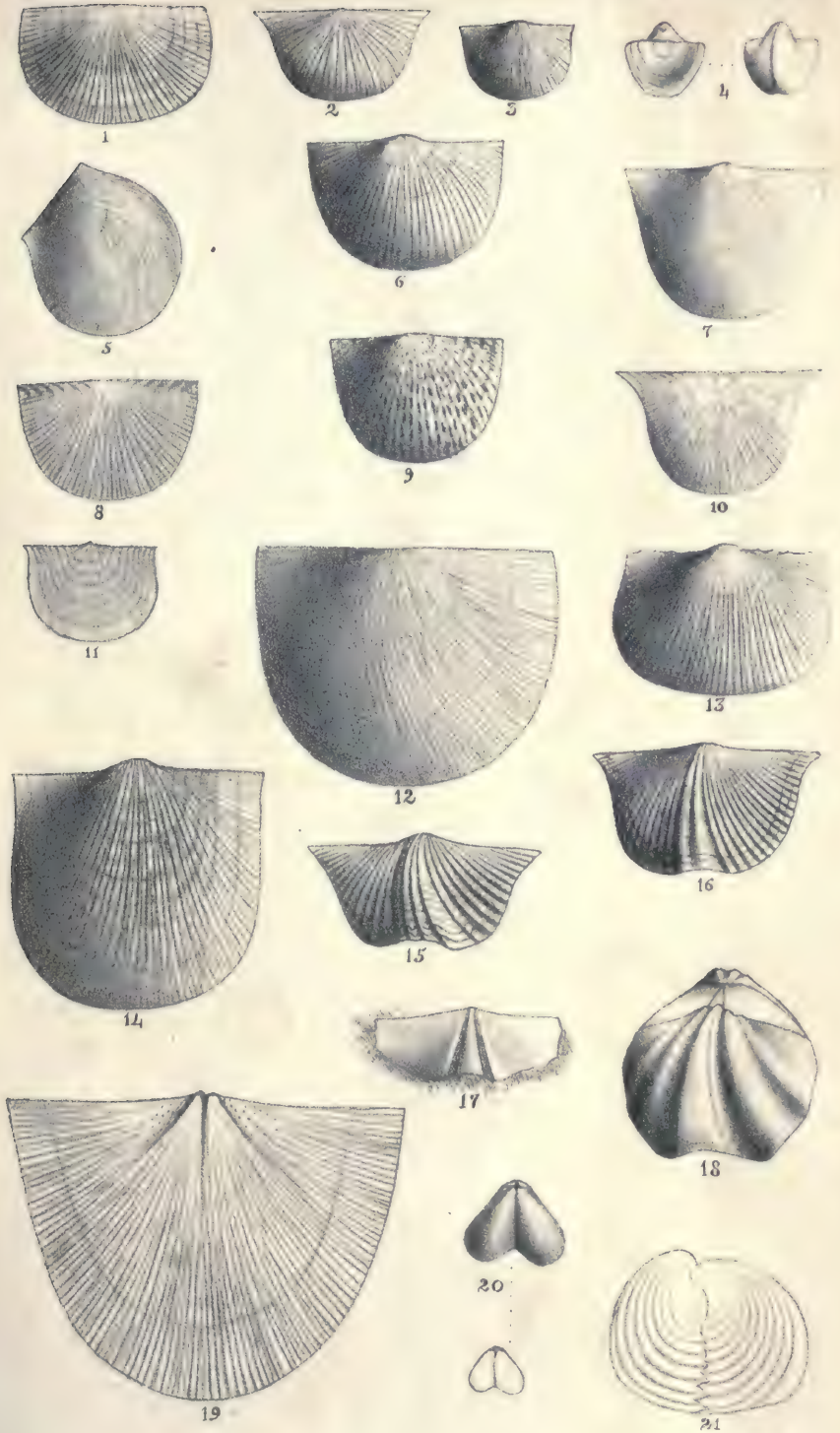






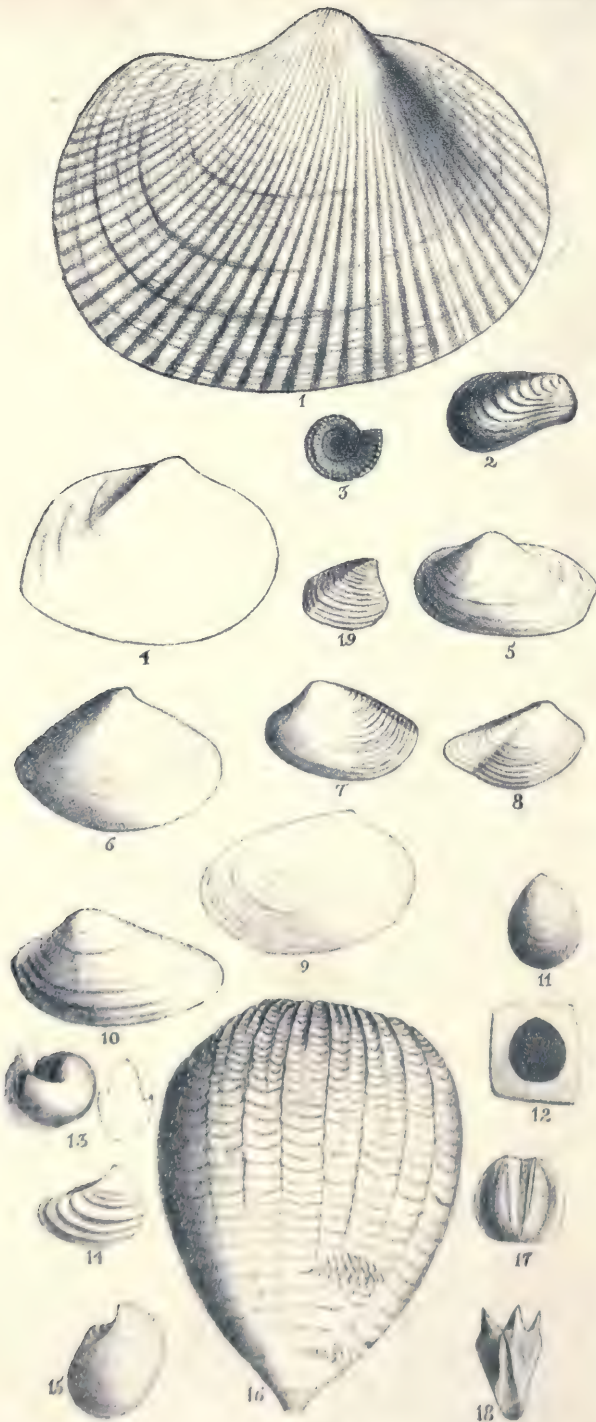


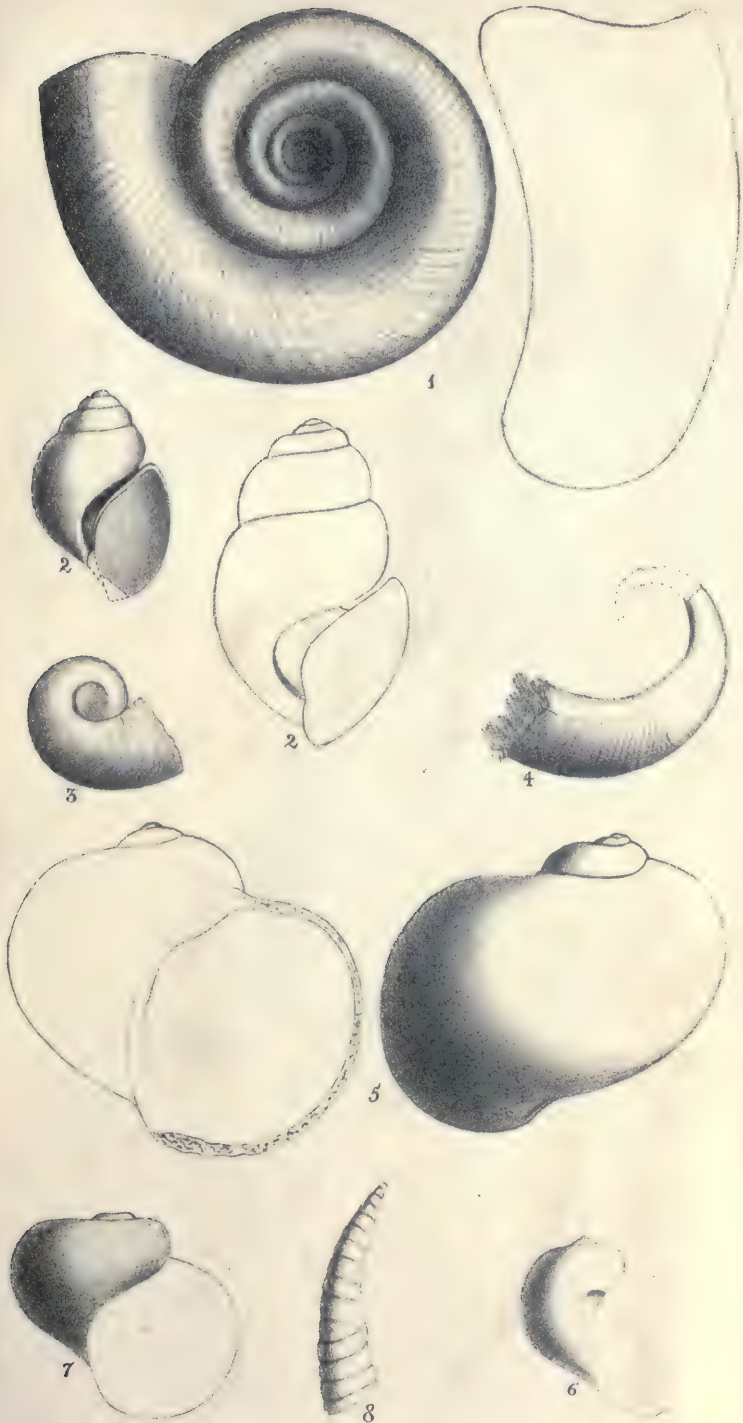
















CHAMAELÆO CRACILIS.

From life on stone with the lizard.

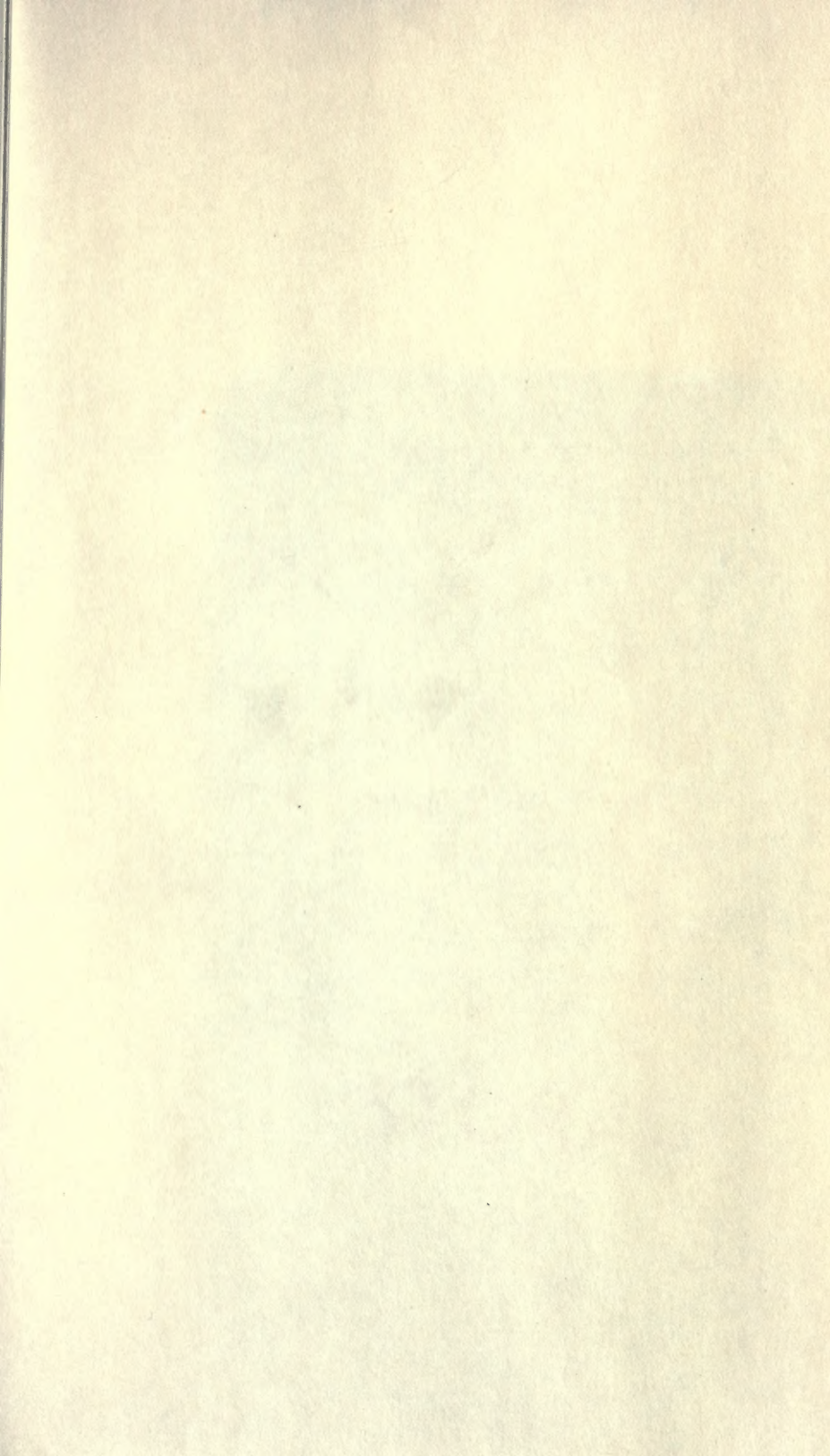


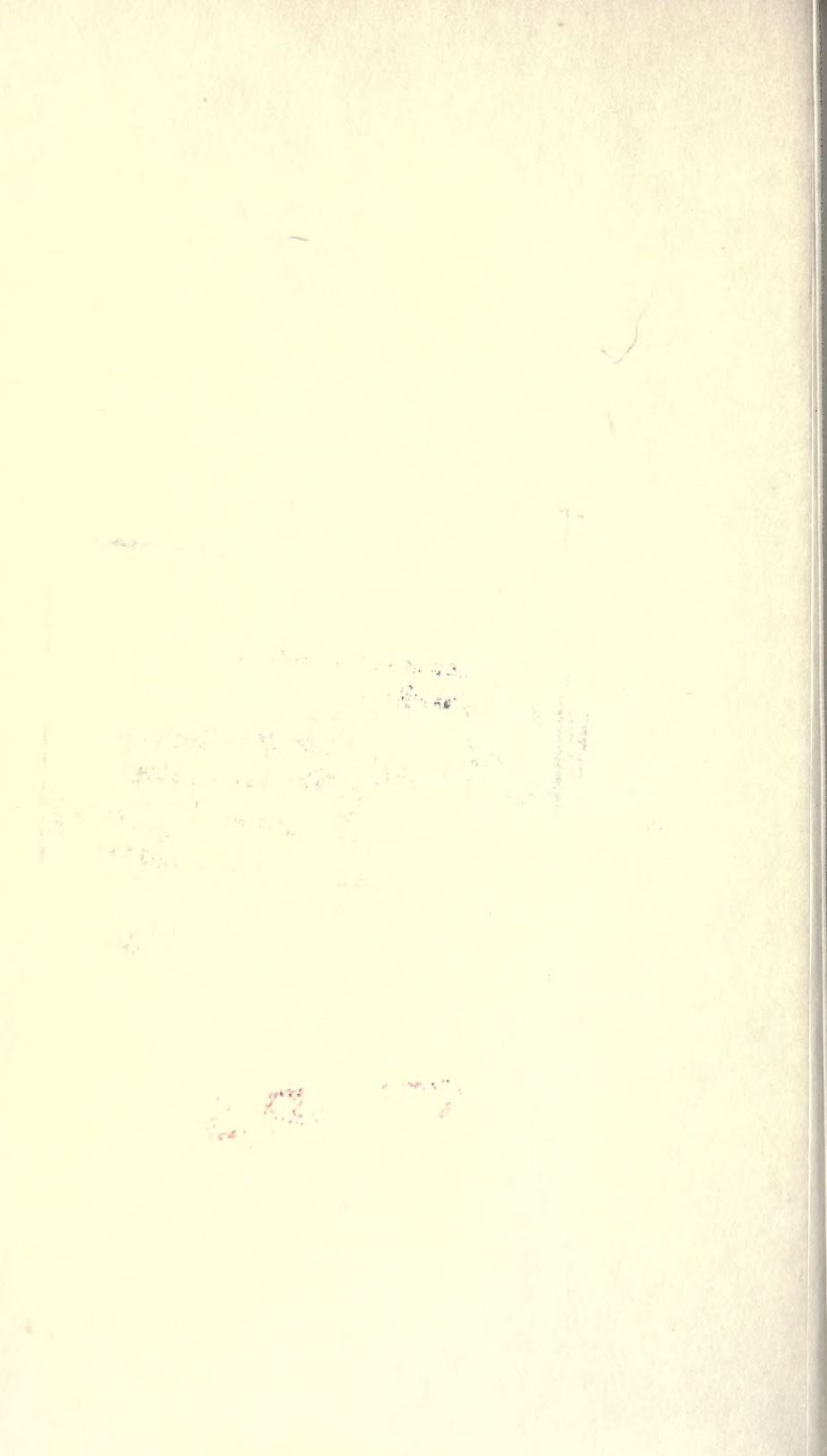


Distichurus Macoulatus.









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